ACROSS THE Editor's Desk

TVA at bat; FCC on deck, and REA in the hole, is the lineup for the coming weeks if we hark back to the old time baseball scorekeeper and his official jargon. We believe the "umps" had something there. We know we have something here. Having hopes of teaching the ABC's to a brand new baby daughter, I find that higher education threw the cherished old ABC sing-song method of teaching in the discard years ago. How long the other alphabet combinations last is something else.

Speaking of higher education leads us still further. It has to do with books for the telephone man. A decided interest in company libraries has been noted during February and March. We have revised our list of books that should be in every company library. In several cases we find company libraries are started by contribution of books already purchased by employees. This list appears on page 31.

Invitations from the Texas and Oklahoma Telephone Associations to attend their convention this month will be heeded. Both of these associations have scheduled a golf tournament for the day preceding their opening. Rambler drew the lucky straw and will represent us. The suppliers and manufacturers are considerably heartened by a better outlook and will do much toward aiding state associations by their up-to-date exhibits. All of you state association members have a treat in store to see the many new developments shown by these suppliers.

TELEPHONE ENGINEER

MANAGEMENT · ENGINEERING · MAINTENANCE

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CONTENTS

Cover Illustration—J. Hartwell Jones—
Peninsula Tel. Co., Tampa

- Across the Editor's Desk..... 3
- The Unusual in Telephone Construction
  By Ray Blain..... 17
- "Tapping In" on Washington
  By Roland C. Davies..... 19
- Not Only A Joy Forever—Act X
  Showmanship in Business
  By Zenn Kaufman..... 21
- Local Test Desk Operation
  By C. F. Curtiss..... 23
- Preview of Utility Bodies for 1938..... 25
- Durable Douglas Fir Crossarms..... 28
- Monthly Station Barometer..... 30
- Long Lines, By R. A. Clark, Jr..... 32
- Line & Desk, Conducted by Ray Blain..... 36

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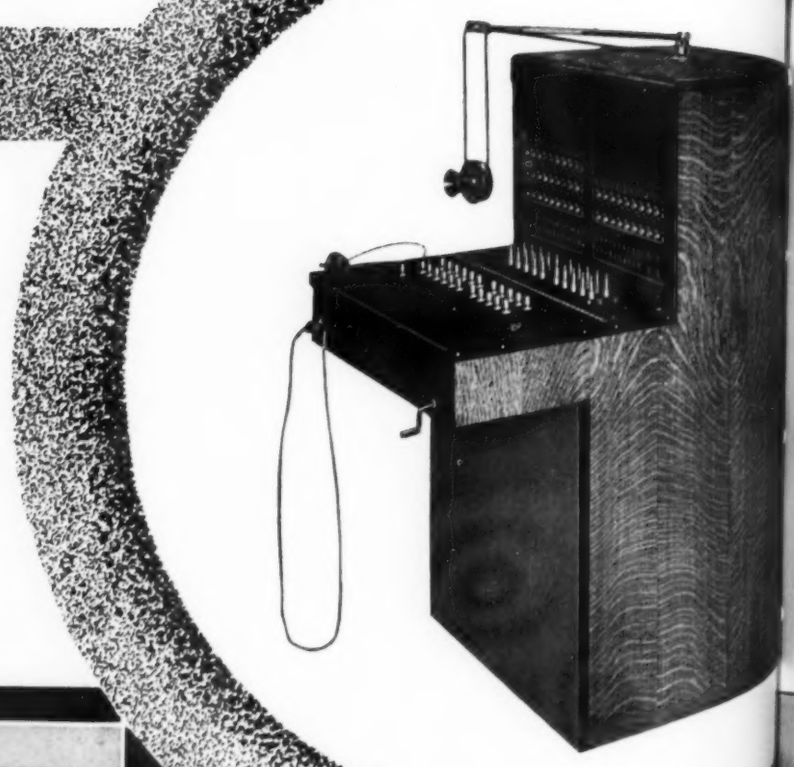
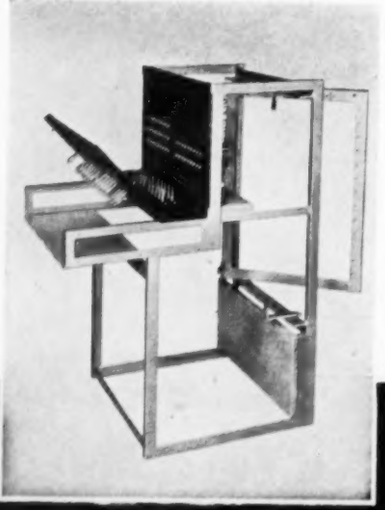
the Masterbuilt idea now comes to you in Magneto





A special brid
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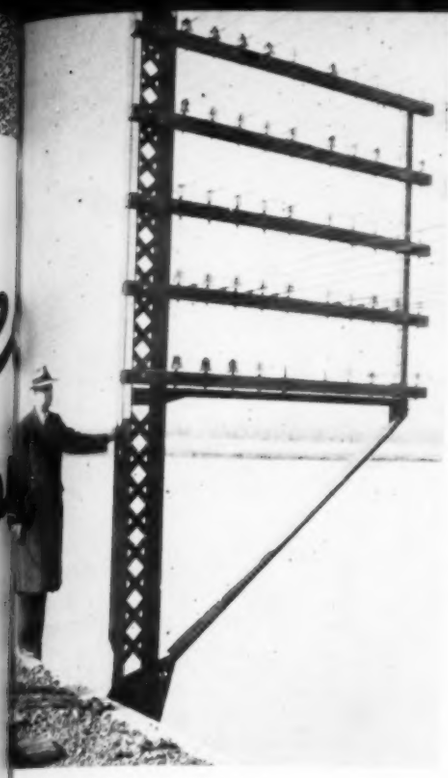


A special bridge fixture used for an open wire river crossing on a railroad bridge

The UNUSUAL in Telephone Construction

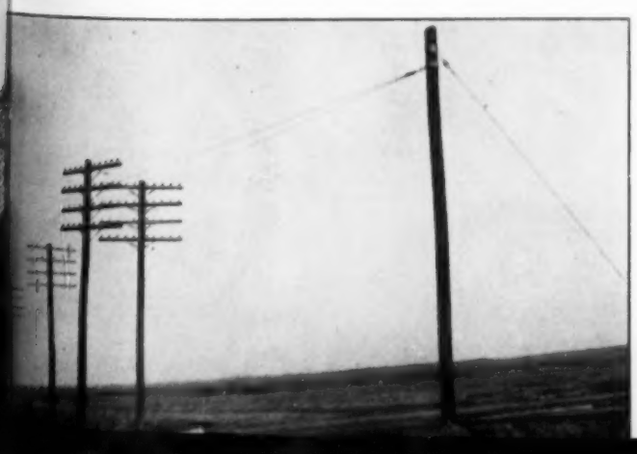
We all have a tendency, more or less, to follow the beaten path as it is generally the one of least resistance. When an especially difficult task confronts us, rather than suffer the mental exertion necessary to devise a special plan to meet the condition satisfactorily and economically we just remodel some old plan as best we can to handle the situation.

By RAY BLAIN

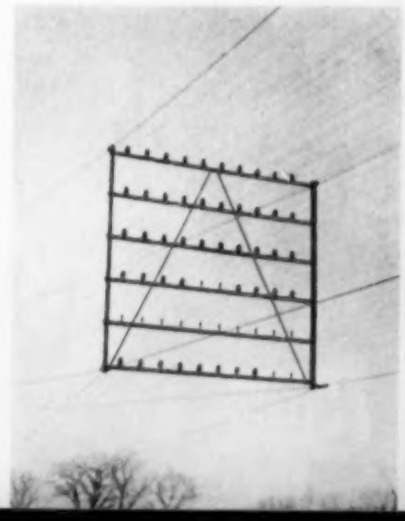
IT has been said that there is very little original thought in the world and sometimes this does seem brutally true. Telephone men though do generally keep mentally alert and at all times make the most of every opportunity by devising special plans to best meet out of the ordinary conditions. In this article an attempt will be made to describe briefly a few of the outstanding brain children of telephone men which have been used to meet special conditions in various sections of the country. It is hoped that some of these ideas may be useful in helping solve some of the difficult problems of others.

● One telephone job always considered difficult is the crossing of large rivers with open wire lines and cables. One company effectively solved this problem by attaching poles to the piers of an abandoned bridge. Special iron fixtures may often be attached to highway or railroad bridges to hold standard crossarms for supporting open wire. Sometimes open wire is made to span a river direct and in such case a spacing crossarm may be necessary at some central point. Such fixtures may be supported by messenger strand to hold the open wire firmly in position and prevent excessive sway. Aerial cable may also span a river but in this case double messengers and special guying is generally necessary due to the excessive weight of the cable span. When the cable and messenger is attached direct to a steel bridge it is generally necessary to insulate it from the bridge for electrolysis reasons. Wood brackets are generally used for this purpose. When the cable cannot be conveniently insulated from the bridge structure, insulated splices should be cut into both the cable and the messenger on each end of the bridge. When this is done it is generally necessary to connect the cable sheath over the two splices and across the bridge with insulated wire to provide continuity for the sheath and reduce noise.

Railroad crossings are always a disagreeable job with heavy open wire leads. Cable crossings are comparatively easy for even when placed aerial it can dip underground for the crossing at no great additional expense. This arrangement is not so desirable with open wire as two cable terminals with necessary protection are both expensive and difficult to maintain on a heavy open wire lead. Neither is an aerial crossing desirable due to the necessity for using extra high poles. One construction man solved the problem by dipping under a railroad track on short poles at an overhead highway crossing. This made a cheap and most serviceable means of crossing the railroad. If adequate clearance cannot be obtained



When a right angle corner must be made in a heavy open wire line then we prefer two two pole variety.



Sometimes even heavy open wire leads span a large river. When this is done it is generally necessary to provide a spacer in the center. This spacer may be held in place with messenger.

Laying multiple clay conduit in the winter time.

on this type construction and it is feared that loose objects such as short pieces of wire may be thrown into line and cause trouble, insulated tree wire may be used for the crossing spans.

● On a certain heavy open wire lead it was necessary to follow the paved road around a sweeping curve. Space was limited so that proper lead for standard guying could not be obtained. The problem was successfully solved by using "H" fixtures, raking them and guying across the two. Corners in heavy open wire leads are always to be avoided when possible, but from necessity a certain number must be used. Often two small corners can be used to advantage in the elimination of one heavy one. *When a right angle corner must be used we prefer the two pole variety, rather than a buck arm.*

A county road running parallel to a railroad was being graded wider and it appeared that a heavy open wire lead must be moved. Finally an arrangement was made to have an island of earth left around each pole to avoid moving the line. This happened several years ago and the lead is still giving good service and the company has realized a considerable saving from the unique arrangement.

ON a certain rural line, in the interest of economy, poles were spaced twice the usual distance and then spreaders were placed on the wires in the center of each span. This can in no manner be considered a standard practice and is not generally recommended but strange to say it has given wonderful service in that locality for a number of years.

In the regrading of a county road deep cuts were made and to avoid running up and down hill the poles were set along the side of the pavement and in the cut. The one end of the crossarms barely cleared the bank. Later growing vegetation caused a heavy leak on the outside circuit. The difficulty was eliminated by setting the pins closer together and vacating the two end pins. This worked so well that the company used the same arrangement on another lead instead of adding a second crossarm, the one crossarm was made to accommodate 18 wires instead of the customary 10. This practice *cannot* be generally recommended except perhaps in somewhat sheltered sections of the country.

● Some construction men seem to be of the opinion that the push brace is obsolete but it may still be used to advantage on many jobs and provides a cheap and easy method of guying. One strange combination recently noted was an extension arm fixture and a push brace combination on the same pole. While this is unusual it was necessary as there was not room for the usual down guys and the extension fixture was necessary to properly clear trees. The extension fixture arrangement can often be used to good advantage to provide clearance when other ordinary means fail to do a good job.

On another heavy lead it was necessary to anchor an extra heavy strain for a large river crossing. A preliminary study indicated that it would be cheaper and better to install a multiple of ordinary guys and anchors instead of one large special type. These guys were located in the edge of a field where stock grazed so guards were considered necessary. The completed job presented an unusual appearance but proved entirely satisfactory in every way.

On a large construction job a suitable winch could not be obtained to pull-in underground cable. A heavy truck was

Special spacers placed in the center of extra long spans on a rural line.

tried on a direct pull but as the ground was covered with snow, proper traction could not be obtained to handle the strain. It was finally arranged to make use of an old wartime tank equipped with caterpillar treads. This machine was driven through a gear ratio of about 96 to 1, had practically unlimited power and could pull as slow as desired. The job was completed in record time and without difficulty.

● Due to extending and repaving a main highway it was necessary to move a heavy aerial toll line cable. The engineers at first recommended a new underground cable at considerable expense and to salvage the old. Someone then suggested the idea of lowering the old aerial cable, load coils and all, and burying directly in the ground. The trench was dug so as to care for all slack and the cable was buried for a distance of several miles. The cable itself was inclosed in a tar paper trough filled with compound to prevent the possibility of corrosive action. The tails in cable terminals were extended and they were installed on poles near where the cable was buried. This job though quite unusual has given practically perfect service for nearly five years at a tremendous saving to the company. Had the men in charge not had the courage of their convictions and to try something new the construction of a conduit system and cable, at considerable expense would have been demanded. This is just another case where good judgment and courage combined, saved money for the company.

When digging trenches for underground conduit by the pick and shovel method

(Please turn to page 34)

Showing cable terminal on toll cable being buried. This cable tail was extended so that terminal could be permanently installed on pole.

Using an old wartime tank caterpillar truck to pull-in underground cable.

"Tapping In" On Washington

By ROLAND C. DAVIES
Editor
Telecommunications Reports

WITH its anxiety to end its present session as soon as possible so it can launch its campaigning for the November elections, Congress is not disposed to take any action on the Telephone Investigation report of the FCC during its present session. No hearings on the report before the Senate and House Interstate Commerce Committees at the present session appear at all likely, because the programs of legislation pending before the two committees are expected to fully occupy their time up to the adjournment of the present Congress.

Thus, every sign points to no consideration or action by the present Congress, until the new session—and a new Congress—convenes next January, on this "magnum opus" of the FCC. What will be the political makeup and policy-alignment of the new Congress depends on the outcome of the November elections and whether or not Republicans make any gains in their Senate and House membership and "middle-road" Democrats are victorious. *Therefore the outcome and final shape, of the FCC report's legislation recommendations will naturally depend on the character of the new Congress.*

● The situation in Congress which would mean no speedy consideration of the FCC's recommendations is one big "if" that should be weighed by the telephone industry in its own thoughts on the Investigation report. Another "If" is the possibility that the new Congress may turn towards a conservative "middle ground" course—or the other way more towards the "left." An important "If" is the Commission's own action on the Investigation Report—whether it will be the drastic form as presented in its first draft to the FCC or will be revised to a considerable degree before it is finally transmitted to Congress. Many of the rumored recommendations in the Report broaden the scope of the FCC's regulation over the Bell System, particularly the operations of the American Telephone and Telegraph Company and its manufacturing subsidiary, Western Electric, and its research organization, the Bell Telephone Laboratories, and, as these desired new regulatory powers to a large extent border upon the field of managerial responsibility, those proposals probably will meet the greatest clash of views within the Commission in its formulation of the final Report to Congress.

THE FCC has at last plunged into the task of studying the draft of the report, prepared by the Investigation staff. It appeared likely that the Commission will be forced to spend several weeks before the report can be whipped into final shape for its transmission to Congress. Not only the length of the report—some 1,200 typewritten pages—but also the division of views among the Commissioners will mean the final draft would require a considerable period of study.

Chairman Frank R. McNinch has expressed the hope that the Investigation report would be transmitted to Congress in two or three weeks after it was first turned over to the individual Commissioners in its draft form in early March. But, because of the division of views among the Commissioners, it was thought quite likely that several weeks of study and revision would be necessary and that probably the earliest period of the transmittal to Congress would be in early April. The Chairman stated that the report would be approved either in its draft form in toto as submitted by Commissioner Walker or should be revised through the suggested amendments of the other Commissioners. The Chairman in a recent conference with President Roosevelt also is understood to have informed the Chief Executive about the plans of the FCC to study the report so as to finally prepare it for Congress.

Rumored Recommendations In Draft Of Report

● A number of the purported outstanding proposals in the report's draft have been revealed—without official confirmation, however. It is known that the draft of the report follows the tenor of attack which was disclosed in the exhibits and testimony placed in the record of the two-year Investigation hearing and there is no line of commendation and praise about the successful telephone service of the United States—despite the fact that the FCC in its recent annual report cited the telephone service of America as superior to that of any other in the world.

The most sensational recommendation in the draft of the report is the rumored proposal that the Western Electric Co., the manufacturing subsidiary of the Bell System, should be severed from the American Telephone and Telegraph Co., which own nearly all of its stock. This recommendation would not seek in all probability any Congressional sanction for such a step but is a proposal for the Government to launch an anti-trust case. Thus, if the FCC should approve this recommendation, it would be an issue which would be plunged immediately into a court test—provided the Justice Department accepts such a proposal of the FCC.

The repercussions of a proposed divorcement of the Western Electric from the A. T. & T. undoubtedly would be startling development not only for the Bell System but also in the activities of the Independent Telephone manufacturing industry. First, the FCC's objective might be to force the Bell System telephone companies to buy in

the open market their apparatus and plant supplies. This is predicated on the belief that the Bell System companies could obtain better prices for their equipment despite the record, claimed by Western Electric, of selling to the Bell System companies at lower prices than those of Independents. However, that no excessive profit has been garnered by Western Electric was claimed in that company's annual report for 1937 which showed a 4.9 per cent return for a 20-year period from 1918-37.

● In regard to another issue, the FCC recommendation might probably precipitate opposition or trepidation from the Independent manufacturing industry. It is felt in some circles that Western Electric, because of its size might possibly dominate the telephone manufacturing industry and through lower prices could injure the Independent branch considerably in any competitive struggle. In the sale of equipment to the Bell System companies, the Western Electric plants are also adapted to special Bell System types of apparatus and supplies so their manufacturing processes thus would contain a substantial advantage over their competitors.

A compromise proposal to the splitting off of Western Electric also is understood to have been projected in the draft of the report which would give the FCC greater power in regulating the costs and profits of the manufacturing company and would compel the Bell System companies to purchase their equipment through competitive bids. Because of the sensational character of a divorcement proposal it is considered possible that a final sanction by the Commission may be on the competitive bidding plan as a suggestion for Congress to consider.

The license contract payments of 1½ per cent of their gross revenues by the Bell System companies to the A.T. & T. might be another important subject of the drafts. The line of attack during the Investigation hearings was that this payment supported "holding company" activities of the A.T. & T. The FCC would require, according to the draft's reported recommendations, that all services by the A.T. & T. to the Bell System operating companies should be on a cost basis and should be justified from the standpoint of necessity and valuable services, it is understood. In considering the facts that the Bell System companies pay the A.T. & T. in their license contract payments around 60 per cent of the cost of the services rendered and that the license payments only amount to about the cost of the Bell Telephones Laboratories' research, such a change might possibly prove a source of financial gain to the A.T. & T. But the draft is said to contain a "mailed fist" in this reported recommendation to Congress in that the FCC would be given power to regulate the types of services rendered especially the research activities of the Bell Laboratories. This later point is understood to be an example of the FCC assumption of a role bordering on managerial responsibility.

● The segregation of plant and revenues between toll and exchange operations is another subject dealt with by the draft, it is understood. This presents a difficult problem of regulation because the telephone company uses the same plant for the two types of service and in such segregations has followed the usual principle of "major use." The Report draft is also thought to propose a more generous division of toll revenues for the originating telephone company which was designed to win favor in Independent telephone circles.

The Bell System pension system is a question which might be brought under considerable fire. The draft of the report is said to assail the pension system as a club used by the A.T. & T. over employees' heads to prevent collective barganing—this phase of the report was evidently fashioned to attract the attention of labor unions. The validity of the pension system in the form of the agreement and the investment of its trust funds in the telephone plant as well as the allegation of an insufficient reserve also were said to have been censured in the draft. The higher pensions paid to executives, it is understood, were cited in the report draft and it is proposed that these high pension payments should be levelled off to the range of payments to the lower ranking employees.

● Depreciation rates of accrual and reserves undoubtedly formed an important section of the draft of the report. A proposal of flexible adjustment of the rates of depreciation at frequent periods to fit the needs of retiring the plant—an idea which has been proposed in some circles of the telephone industry—most likely is contained in the Report draft. However, this recommendation, which was said to have been urged in the draft report, may arouse considerable opposition from the industry because it is said to seek from Congress rather broad powers for the FCC to dictate the methods and rates of depreciation. Thus a greater tightening of regulation over this important element of telephone operations would result. Curiously, we understand the Investigation report departed from the forthsight adherence to "straight-line" depreciation which had been held up by the Interstate Commerce Commission with laudation of the telephone industry's policies when the FCC studied the subject of depreciation. To show the vagaries of the FCC policies the Telephone Investigation staff condemned the "straight line" method, but it was revealed in the recent Telegraph rate increase hearings that the FCC had suggested to the telegraph carriers that they increase their depreciation rates of accrual to bring them into line with the "straight line" principle.

As a curious sidelight on the last lap of the FCC Telephone Investigation re-

(Please turn to page 38)

CONVENTION SCHEDULE

Texas Telephone Association, Adolphus Hotel, Dallas, March 23, 24 and 25.

Oklahoma Telephone Association, Huckins Hotel, Oklahoma City, March 29 and 30.

Missouri Telephone Association, Hotel Muehlebach, Kansas City, April 4 and 5.

Iowa Independent Telephone Association, Fort Des Moines Hotel, Des Moines, April 12, 13 and 14.

Nebraska Telephone Association, Hotel Paxton, Omaha, April 19 and 20.

Kansas Telephone Association, Hotel Kansan, Topeka, April 27 and 28.

Ohio Independent Telephone Association, Deshler-Wallick Hotel, Columbus, Ohio, May 3, 4 and 5, 1938.

Indiana Telephone Association, Claypool Hotel, Indianapolis, May 11 and 12.

Wisconsin State Telephone Association and Wisconsin Locally Owned Telephone Group, Park Hotel, Madison, May 17-19.

United States Independent Telephone Association: Conference of Class A and Class B Companies, Edgewater Beach Hotel, Chicago, May 25 and 26.

Pennsylvania State Telephone & Traffic Association, Yorktowne Hotel, York, June 2, 3 and 4.

New York State Telephone Association, Seneca Hotel, Rochester, June 7, 8 and 9.

Michigan Independent Telephone Association, Hotel Olds, Lansing, July 27 and 28.

The Illinois Telephone Association, Hotel Pere Marquette, Peoria, Sept. 21, 22 and 23.

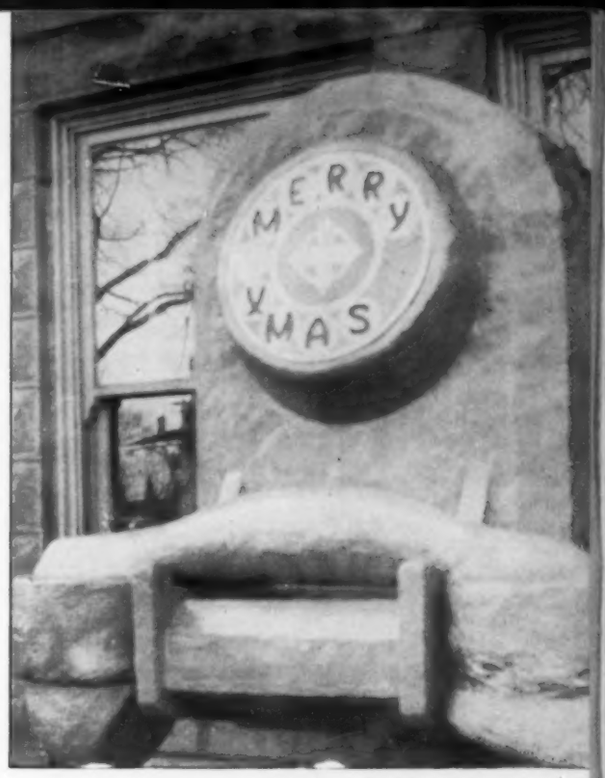
Sing Something Simple

Act X of

Showmanship in Business

by

ZENN KAUFMAN



The Missouri Telephone Co., Macon, used a simple and effective use of showmanship for a Christmas display.

THERE WAS once a telephone lineman who had suffered a broken leg. He was taken to a hospital for treatment. After the leg had been set, a pretty redhead nurse asked him how the accident had happened. He enlightened her in the following words:

"You see, lady, it was like this. I was out stringing for the company and I had one ground mole. He was a big come-along and she was a heavy one. I was pullin' on her and yelled to the mole to give the guy a wrap; instead he threw a sag into her, and that broke my leg."

"I don't quite understand," said the redheaded nurse.

"Neither do I," said the lineman. "The damn fool must have been crazy."

Keep this story always in mind when you are spending any great sum of money on goods, printed matter, or speech that somebody else is supposed to understand — to appreciate — to comprehend. Being at the head of the parade is fine, but being an hour ahead of it is bad. The public mind, as we have suggested perhaps thirty-five times, is amazingly simple.

● Consider!—When they used to put movie dialog on silent screen, do you remember how long they kept the words on the screen? You frequently sat there and said to yourself, "Come on, there I've finished that long ago."

Take your cue from the show business. What shows succeed? Ones with obscure plots? No. The World's Fair thrived on the "cafeteria" atmosphere of selecting whatever entertainment you wanted. And that meant the daring auto races and the "live power" animals. The shows with the widest appeals are those with the simplest story. Opera survives because its great music and plots are so simple. Its simplicity saves its boredom. Adults in the mass—even opera audiences—think slowly when at all—And are childlike. At the fair, National Carbon's Freddie Flash pictures for kids were packed with adults. Circuses, ball games, the movies they don't tax the imagination. Green pastures played for five years not only because of its superb acting, but because the theme was so devastatingly simple. Dying and going to heaven! "Gangway for de Lawd God Jehova" is said to be the greatest entrance cue in the history of the theatre.

● Without rigid simplicity of appeal, its suicide for a promoter of any sort to attempt to interest people in lots of 100,000 or more. Even boxing, for example. As a fine old science and art, boxing has practically disappeared. People won't pay to see a boxer. Or, putting it another way, modern mass production of crudely uneducated audiences seeking the simplest passive sensation has forced ring promoters to offer not smart fighters, but heavy-fisted, thick-skinned smashers, who in the parlance of the ringside, can "dish it out and take it." Such an audience actually resents skill in avoiding unnecessary punishment.

Keep It Easy

The sure way to lose people in any operation is to fail to make clear the pattern of your proposition. Even when listening in self-interest to flattering talk, your human gets restless until you make clear what it is all leading up to. On the other hand, the surest way to take a crowd with you, physically, mentally, or emotionally, is to mark out milestones, so to speak, and give them every now and then the pleasure of marking mutual progress. Speakers who wouldn't attempt to play golf or tennis without setting up scoring units will come out and look an audience in the face without giving it the slightest hint either of points to be scored or even of ultimate goal.

RAY MARTIN of the Consolidated Edison Company has always scored big sales from window displays because he just makes glass front billboards out of them. He takes full advantage of the third dimension but dramatizes just ONE idea and always a simple one.

A simple and effective Christmas display was recently used by the Missouri Telephone Co. in Macon. On their building was mounted a huge stone slab—cut to resemble a handset. The letters M-E-R-R-Y X-M-A-S were printed around the face of the dial.

Keep your sales contests simple. The thing that breaks up more contests than anything else is a complicated scoring plan. If your salesmen need a slide-rule and a knowledge of calculus to unravel their position in the contests, you can be very sure they will be lost in a maze of blindman's bluff.

● Phone Companies simplify their training programs by just handling salesmen a list of fifty statements about their service and ask them to mark each statement right or wrong. Thus learning is

FREE: JUST SEND A SELF-ADDRESSED STAMPED ENVELOPE AND WE'LL SEND YOU THE SHOWMANSHIP YARDSTICK A CHECK LIST OF SHOWMANSHIP ELEMENTS — FREE

made palatable and simple.

Of course, It's in face-to-face selling that the gearing down is needed most. Outside of the salesman who won't say anything of sales value, the greatest menace to a sale is the salesman who overflows the prospect with a mass of unimportant and confusing detail, putting the customer in the position of the man in the restaurant to whom the waiter pours out an offer of apple, peach, pineapple, strawberry, and cocoanut custard.

● The great emotional appeals of history have all been simple. The reason is plain. Showmanship is purely an emotional approach. Few people can feel more than one emotion at a time. The comparatively few who can reason can, perhaps, juggle several ideas into a logical action. But the mass to whom you appeal emotionally experiences only one impulse at a time. When Lawrence shouted, "Don't give up the ship," he didn't add any ands, ifs or buts. Consciously or otherwise, he knew better than to divert interest from his point. Similarly, with "Remember The Alamo," "Out of the trenches by Christmas," "A chicken in every dinner pail," and a score of other commands that have stirred the millions. Richard Borden, whose teaching of sales tactics has been marvelously successful, rates this intense concentration on one simple appeal as a fundamental feature in all showmanship and, indeed, in all effective selling.

Or, as my young friend Alan Tripp says, "Be sure you don't leave them—gasping for breath and grasping for meaning.

Acknowledgment is made to Harper Bros. for permission to reprint parts of "Showmanship In Business" by Goode & Kaufman.

National Association To Hold May Conference

Notice has been sent to the United States Independent Telephone Association to all class A and B companies notifying them of the conference to be held at the Edgewater Beach Hotel in Chicago May 25th and 26th, in a letter to these companies dated March 3rd. A tentative program includes three important subjects: Toll Compensation, Accounting-Continuing Property Records-Depreciation, and Coordination of Electrical Interference.

The association is asking for comments on the program with the idea of having it cover the more important subjects needing special attention. Association officers believe the conference will be of such importance as to warrant the participation of the executive heads of the A and B companies, also the heads of the departments involved. It is strictly a business meeting scheduled and much will be accomplished during the two day conference.

●

A. H. Mellinger President Of Ill. Bell

Important changes in the executive personnel of the Illinois Bell Telephone Company, including the election of Aubrey H. Mellinger as president to succeed Floyd O. Hale, who was elected chairman of the board of directors, were announced by the company recently.

William O. Kurtz, who for eight years has been general manager of the company's Chicago area, was elected vice president in charge of operations to succeed Mellinger.

A. H. Mellinger Elected President, Illinois Bell Telephone Company.

The appointment of Paul J. Ramsey as general manager of the Chicago area, Leland R. Mapes as general manager of the state area, and William V. Kahler as chief engineer of the Chicago area, was also announced.

At the annual meeting of stockholders today, Kurtz was elected a director. All other officers and directors were re-elected.

Plans Completed For Texas Convention

With all plans completed for the annual convention at the Adolphus Hotel, Dallas, on March 23, 24, and 25, officers of the Texas Telephone Association are looking forward to larger turnout of their members than ever before.

Besides the usual bang up program annually offered by the association, the Golf Tournament Committee has announced a golf tournament on Tuesday afternoon March 22, at the Lakewood Country Club to be followed by a buffet supper. The tournament starts at 1 P. M. and prizes will be awarded for low score, next to low, and third low, based on medal score. There will also be prices for the longest drive off the first tee. Other prizes will be awarded, the details of which have not yet been worked out by the committee. The prizes will be awarded at the buffet supper immediately following the tournament.

The officers have worked for several months preparing the association program under the able direction for Oscar Burton, Gulf States Telephone Company, Tyler, who is president of the body. In a personal invitation to this publication Mr. Burton states he is well pleased with the program to be offered and the entertainment prepared for those in attendance.

Sam H. Shutt, Texas Telephone Company, Sherman is chairman of the tournament committee assisted by Don Hunsaker, E. P. Dwelle, Howard Howsley, Paine Nelson, E. B. Patterson, and Vernon Young. Don't forget the date, March 22nd through 25th.

●

Oklahoma Association Meets March 29th and 30th

Preceded by a pre-convention golf tournament, the 24th annual convention of the Oklahoma Telephone Association will be held at the Huckins Hotel, Oklahoma City, March 29th and 30th.

Secretary H. W. Hubenthal has announced a very interesting program with many speakers of national reputation. Besides the golf tournament, other entertainment features will include a dinner and dance with incidental entertainment.

●

"Manifest Unfairness" Says Wisconsin Judge

With caustic criticism of what he called the "manifest unfairness" of the public service commission, Circuit Judge A. C. Hoppmann has declared illegal four commission orders for statewide reduction in the local service rates of the Wisconsin Telephone Company, a unit of the Bell system. (See page 20)

Local Test Desk Operation

By C. F. CURTISS

Wheatstone Bridge Methods of Locating Faults in Line Circuits.

THE following methods of locating faults in line circuits are given with the thought in mind that the technical principles of operation of the Wheatstone Bridge are undoubtedly familiar and in consequence thereof the theoretical details of the Bridge operation are herein omitted and only the necessary test set up procedure is given.

For the purpose of locating a ground on a line circuit and in order that the unknown resistance of such a ground may be rendered of negligible value the Varley loop test was devised.

● This method of locating grounds consists, first, in connecting together the ends of the wires in trouble at the distant end from the home exchange and then measuring the total resistance of the loop formed by the two wires, the latter becoming a continuous metallic circuit and the ground or fault being ineffective in so far as the loop is concerned.

As an example, consider a pair of line wires of any length, uniform in size and resistance throughout, and looped together at their distant end. At the home end the wires are connected to the wheatstone Bridge "X I" and "X 2" binding posts as shown in Figure I. Under this condition it will be noted that the distance from the Bridge to the "Loop" both the resistance and length of each conductor will be equal and therefore indicates the middle of the loop electrically. Thus in Figure 1, the loop resistance according to the Bridge formula is $\times = A/BR$ or $10/10 = 1 \times 500$ equals 500 ohms as each side of the loop contains 250 ohms. If the line should happen to become grounded at the point "Loop" the distance up to that point in ohms from the Bridge would obviously be equal to 500 divided by 2 or 250 ohms as indicated by the dotted line to ground. In practice, however, a ground or other fault does not usually occur at such convenient location.

Figure 2 shows that while the total resistance of the loop remains unchanged, the ring side has been shortened 50 ohms and the tip side lengthened by an equal amount. That is, the tip side contains 250 plus 50 or 300 ohms, while the ring side contains 250 minus 50 or 200 ohms, indicating a difference of 100 ohms between the original and changed value. If an attempt is made to locate the fault or "ground" as shown in Figure 2 by the rule previously given, the quotion obtained by dividing the total loop resistance by 2 would still indicate that the fault was at the "Loop."

In order to ascertain just where the fault really is it is necessary to make the fault the middle of the loop which as formerly stated, can only be the case when the resistance of the tip and ring sides of the line are equal.

● If enough artificial resistance is inserted in series with the ring side of the loop to make the total resistance therein equal to that of the tip side, the fault will now be equal to one half of the total resistance of both the tip and ring side of the line.

In Figure 2, the value of the resistance between the Bridge binding post "X I" and the "fault" is 250 plus 50 equals 300 ohms, and that resistance between binding post "X 2" and the ground is 200 plus 100 ohms inserted in the Bridge rheostat "R" or 300 ohms also. The original resistance of the loop equals 500 ohms, substracting from this amount the 100 ohms inserted in the rheostat as shown in Figure 2, and dividing the remainder by two, the quotion will give the actual distance in ohms between the Bridge binding post "X2" and the fault, or 500 minus 100 equals 400 ohms, and 400 divided by 2 equal 200 ohms, the resistance of the ring wire measured to the point where it is actually grounded. From this operation is obtained by the Varley loop formula $D = L \cdot V/2$ where

In previous installments of this series of articles, several methods of measuring resistance using voltmeter or ammeters or both as a means of locating telephone line circuit faults were discussed, and it was pointed out that the methods to be applied in each case depended on the relative size of the resistance to be measured and the degree of accuracy desired. For the purpose of fault locating measurements which require greater precision than the use of voltmeters or ammeters the Wheatstone Bridge is used.

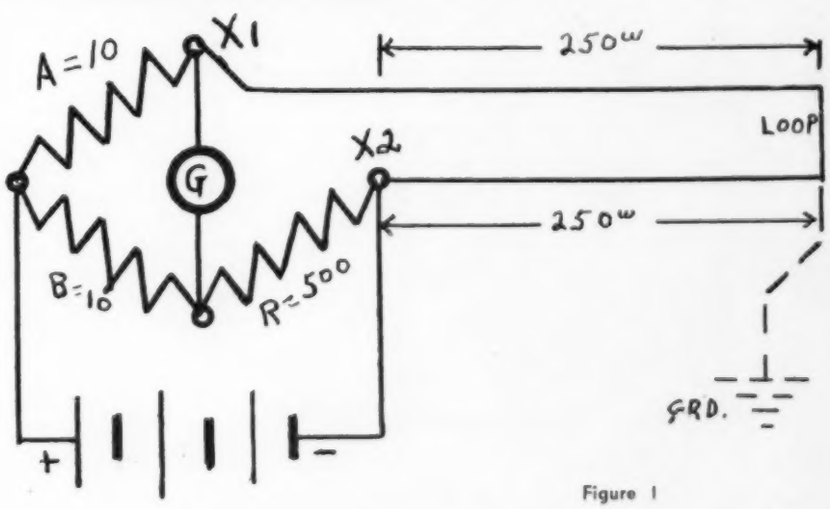


Figure 1

"D" equals the distance in ohms resistance of the two line conductors measured as a metallic circuit or loop, and "V" the resistance inserted in the bridge rheostat with one pole of the test battery grounded.

In the Varley measurement the resistance inserted in the rheostat always represents twice the value of that portion of the line wire at fault between the fault, and the loop, that is, the point where the two sides of the circuit are connected together at their distant end, because that length of the line conductor is added to one wire and the latters increased resistance value must not only be compensated for in the shorter length of conductor but the value of the missing portion must also be made up in the same manner.

● The method of operating the Bridge to perform the Varley test as outlined, should be as follows: The ratio arms "A" and "B" made equal, that is, 1/1, 10/10, etc. as shown in Figure 1 and 2. Then the faulty or bad line wire is connected to the Bridge binding post "X2" and the good (ungrounded) wire to the "X1" post. The two wires should then be connected together at their distant end to form a loop. Next, the Bridge rheostat dials are adjusted until the galvanometer needle rests at zero. The amount of resistance inserted in the rheostat in order to accomplish this represents the ohmic resistance of the loop as a continuous metallic circuit. In the example given above it will of course be 500 ohms. Then one pole of the Bridge battery is disconnected by means of a key from binding post "X2" and connected to the earth as shown in Figure 2. The resistance of the two line conductors to the fault will now be uneven and the difference of course must be inserted in the Bridge rheostat. When the proper amount is inserted the galvanometer needle will again point to zero, this completes the test and all that is required is to make the necessary calculations, using the figures in the diagrams and applying the Varley formula: D=L—V/2, or 500—100=400/2=200 ohms and is the resistance to the fault.

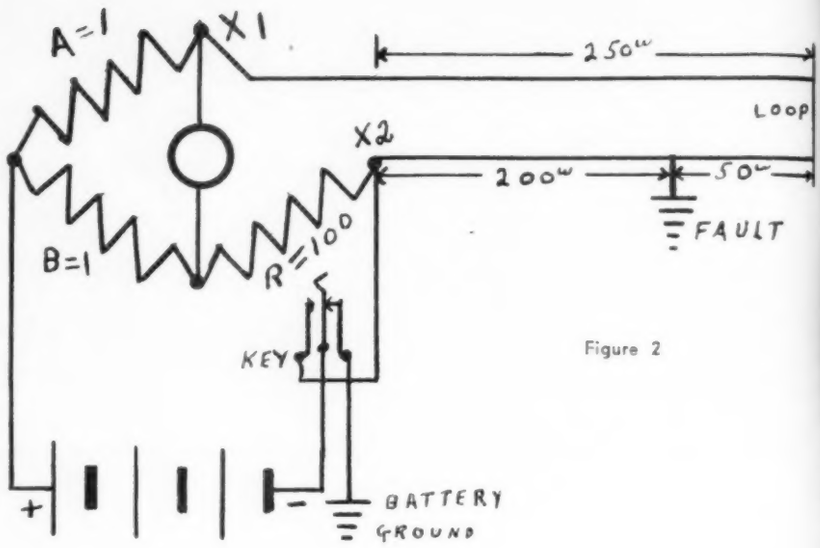


Figure 2

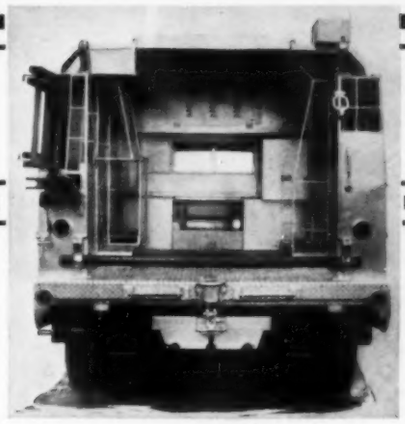
Only the distance in ohms to the fault has been obtained so far. What really is required in order to locate and clear the fault is the actual distance in feet or miles, as the case may be. In order to determine this, the resistance in ohms to the fault must be divided by the known resistance per foot or mile, of the faulty wire itself as illustrated in the following method of locating a line ground. (1) Have distant end of the line in trouble short circuited. If this cannot be conveniently arranged, measure into the distant central office phantom coil or switchboard drop as the case may be.

● When this is done it is necessary for the testman to know the ohmic resistance of the phantom coil of the switchboard drop located in the distant central office. (2) Connect the test cords from the Bridge binding posts to the line as follows, the "X1" cord to the ungrounded side of the line, and the "X2" cord to the grounded side of the line. (3) Set the Bridge ratio dial at 1, this of course depending upon the particular type and make of Wheatstone Bridge being used. (4) Arrange the Bridge switches for making a loop resistance measurement. (5) Vary the resistance in the Bridge rheostat by operating the dials, or as otherwise equipped, until there is no deflection of the galvanometer needle with the battery and galvanometer key depressed. Always depress the battery key before the galvanometer key and release the galvanometer key before the battery key.

(Please turn to page 38)

"I told Mr. Snitzlebank to give me a RING if he wanted a date and he took me literal."

Standard International Panel Body mounted on model D-2 1/2 ton——113" wheelbase 6 cylinder chassis. This model in use by the Home Tel. & Tel. Co., Ft. Wayne, Ind. Made by International Harvester Co., Chicago, Ill.



Interior view of the newly designed line body being featured by Baker-Raulang. A number of this model are already in use in the telephone field. Made by The Baker-Raulang Co., Cleveland, Ohio

Truck-mounted Buda-Hubron Earth Drill on 1 1/2 ton truck with 131" wheelbase. Digs holes to 42" diameter or 50' depth. Ideal for pole construction work. Made by The Buda Co., Harvey, Ill.

PREVIEW OF

1938 UTILITY BODIES

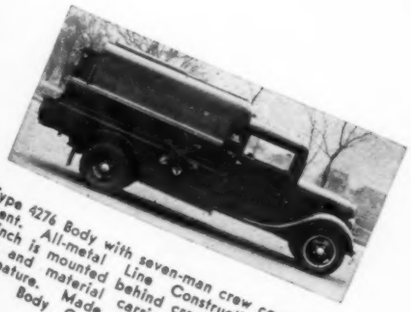
With the cooperation of the various companies featured on this page, TELEPHONE ENGINEER is glad to present this instructive page to the telephone industry.

Heavy construction demands all over the country will make it necessary to replace wornout utility bodies during 1938. These manufacturers are specializing in the types of line construction bodies needed by telephone companies and will be glad to send literature giving full details and prices.

Completely enclosed all-steel body. Slips into any standard half-ton pickup body. Low cost. Can be removed in half hour. Utility Tool & Body Co., Clintonville, Wis.

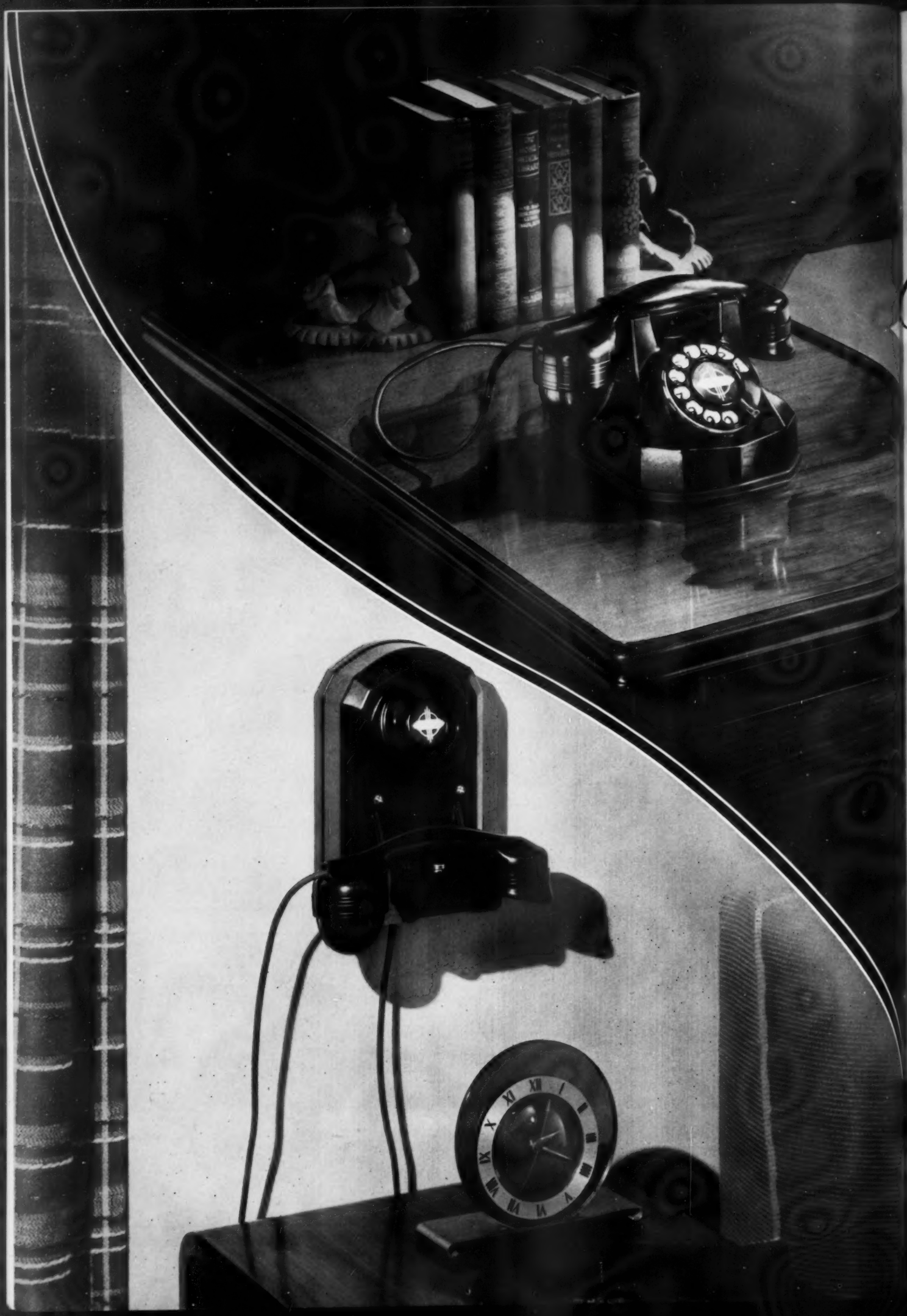
Type HCW Body is a standard body—built especially for the telephone field. Designed by experienced engineers well versed in telephone company requirements—Made by Highway Trailer Co., Edgerton, Wis.

This Utility Body by Four Wheel Drive is mounted on an FWD truck. Built-in power take-off and HM complete accessories available for all utility work. Made by Four Wheel Drive Auto Co., Clintonville, Wis.



Type 4276 Body with seven-man crew compartment. All-metal Line Construction Body. Winch is mounted behind crew compartment, too and material carried forward. Safety e feature. Made by American Coach & Body Co., Cleveland, Ohio.

York-Hoover Utility Body for line construction is proving very popular since this new type was designed. This model is now in use by many telephone companies. Made by York-Hoover Body Corp., York, Penna.



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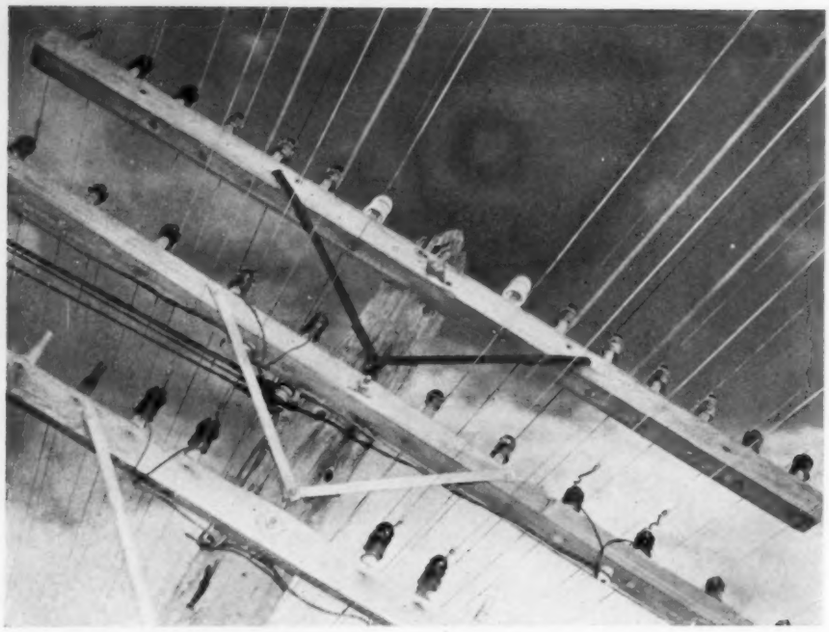


These Douglas fir crossarms on Vancouver Island have been in continuous service for more than 44 years, reports the British Columbia Telephone Company, who placed them first on the main streets of Victoria in the summer of 1893. They now do service in a rural district.

Durable Douglas Fir Cross Arms

Forty-four Years of Service in Victoria District

PERHAPS nowhere in North America is there a better testimonial as to the lasting qualities of Douglas fir crossarms than in the experience of the British Columbia Telephone Company, Ltd., in the Victoria area. The unretouched photograph reproduced on this page shows crossarms placed in service by that utility company in 1893—now more than 44 years. On this subject N. J. Dunlop, district superintendent of the telephone company, says:

"Regarding the age of crossarms in use in the Victoria district, I may state that we still have in service arms that we definitely know were placed on poles in the summer of 1893. There are others that have been in service longer than this but we have no definite record as to just when they were placed. These arms are now in service in the rural areas but were originally on the main streets of Victoria and formed a part of the original telephone plant which was moved under my supervision in 1915. These arms are still sound but the pins have become decayed and are no longer safe and we are changing them as it would not pay us to re-pin the arms. The crossarms, are, of course, straight-grained clear Douglas fir."

We are indebted to the Cameron Lumber Co., Ltd., of Victoria, for the illustration. They point out that the upper arm is of the type mentioned by Mr. Dunlop. These arms are unshaped but the under edge was provided with a rain groove. Traces of the original red paint are still discernible.

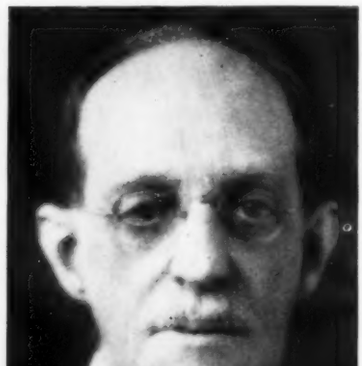
It is interesting to note that F. C. Paterson, district commercial superintendent of the British Columbia Telephone Co. at Victoria, was an early adherent of the Douglas fir crossarm. While building the Manitoba telephone system he became aware of the great strength and durability of Douglas fir for this purpose. He was instrumental in having the Cameron Lumber Co. manufacture some of the first shaped crossarms made in Canada. At his suggestion modern machinery for crossarm production was installed and an order for 20 carloads was placed to supply the Manitoba system.

The late W. H. Hayes, former general manager of the Maritime Telephone & Telegraph Co., of Halifax, was also in Manitoba at that time and because of his crossarm experience continued using Douglas fir. This led to a general acceptance of Douglas fir arms in the eastern territory.

The crossarm business of Cameron Lumber Co., thus developed from an original order of 20 carloads to a regular production of 13,000 to 15,000 units per month. This company operates a crossarm factory at Bellingham, Washington, to supply trade in the United States.

•

Hugh Lesley Dies



Hugh Lesley, Manager Operating Department, The Electric Storage Battery Company, Philadelphia, manufacturer of Exide batteries and widely known in electrical engineering circles, died on February 10, at his home, 155 W. Washington Lane, Germantown, Philadelphia. He was 71 years old.

Mr. Lesley attended Penn Charter School and was graduated from Haverford College in 1887. He was associated with The Electric Storage Battery Company for 43 years. He was a member of the Engineers Club and the Franklin Institute, and was an elder of the Second Presbyterian Church, Germantown.

Those surviving are his wife, Louella L.; two daughters, Mrs. Donald M. White, Newton, Mass., and Mrs. William J. De Mauriac, Germantown; and a son, Joseph, of Oxford, Pa.

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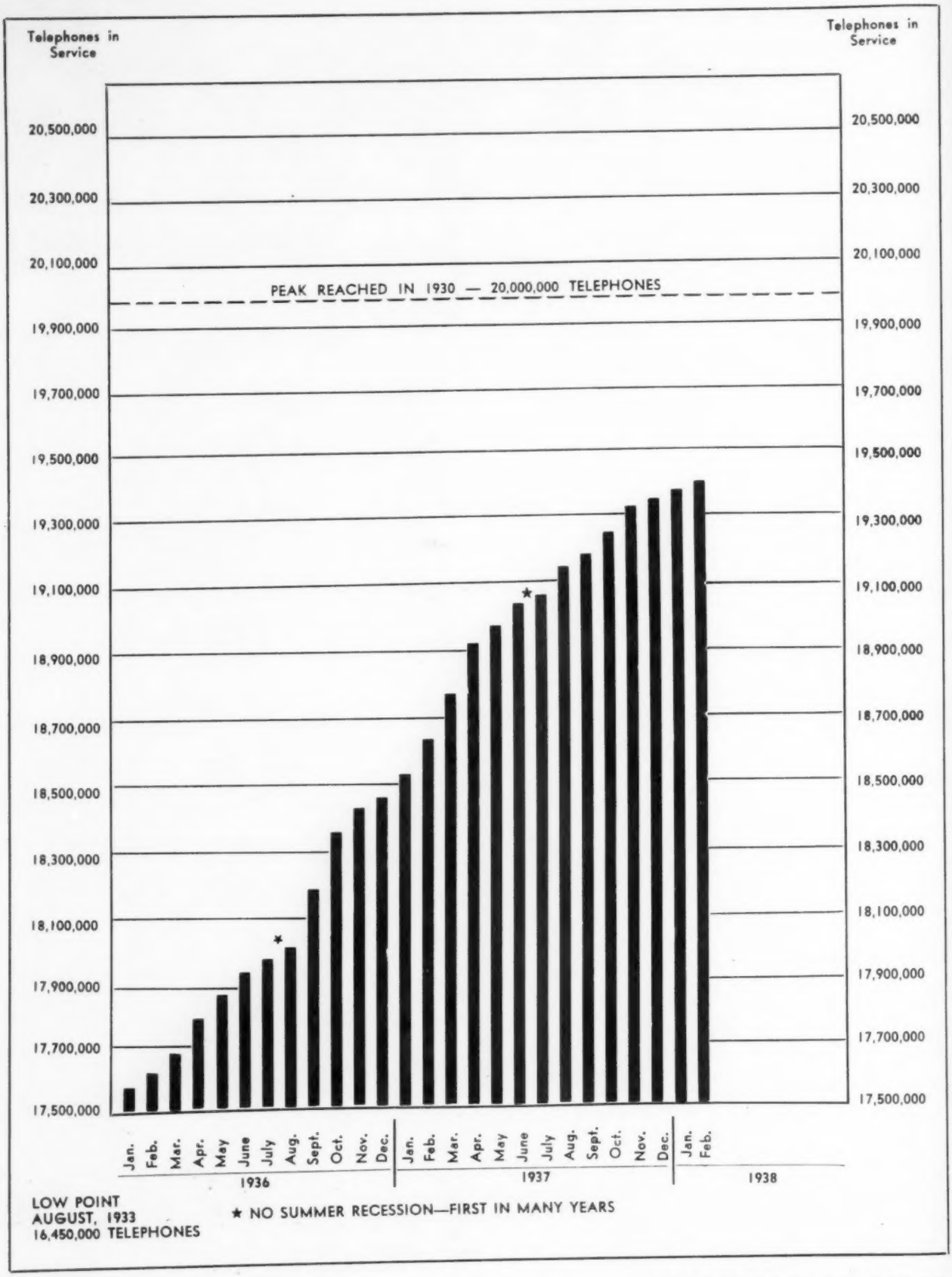

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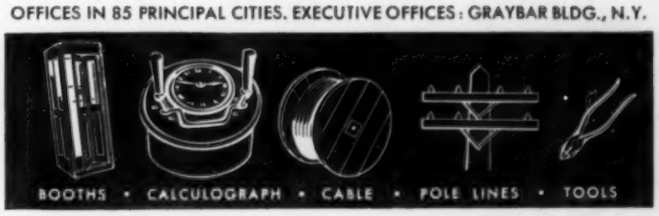
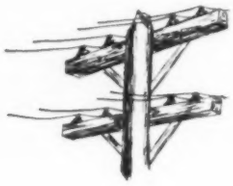


LONG LINES

R. A. Clark, Jr.



Noise Suppression Circuit

The editor desires to pass on to readers of TELEPHONE ENGINEER information and circuit details which will be of use in further improving long distance communication. In this issue, two contributions by Mr. C. H. Williamson of the Frisco Railroad are presented.

On long phantom telephone circuits employing W. E. Co. a-c selectors noise sometimes occurs in the phantom caused by the selector signals. A suppression circuit which materially reduces noise is shown in Fig. 1; it consists of two 1500 ohm resistors bridged across the condenser in the mid-point of the selector repeating coil (C). As you know, the value of this condenser is determined by the number of selectors on the circuit. The mid-point of the two 1500 ohm resistors is grounded through a one mf. condenser.

The noise on the phantom circuit from the selector impulses is due mainly to a residual current from the sending apparatus. The residual current passes through the 70-A repeating coil without appreciable attenuation due to the large capacity between the windings. By grounding the repeating coil as shown in the figure, this residual is effectively short-circuited thus reducing the current through the coil and into the phantom.

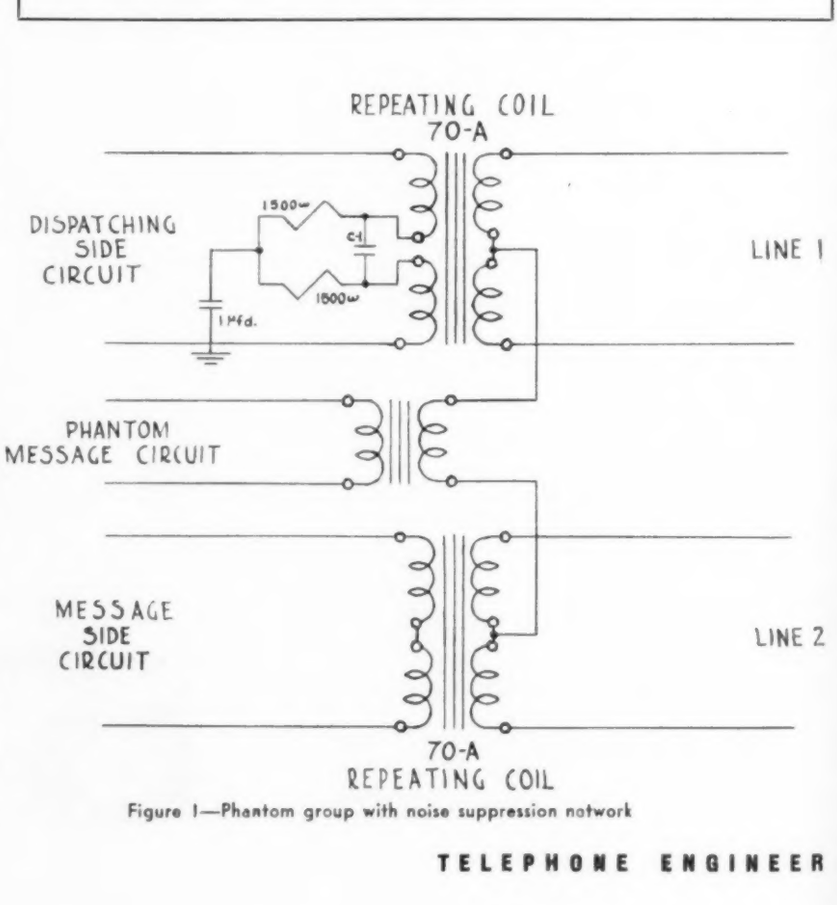


Figure 1—Phantom group with noise suppression network

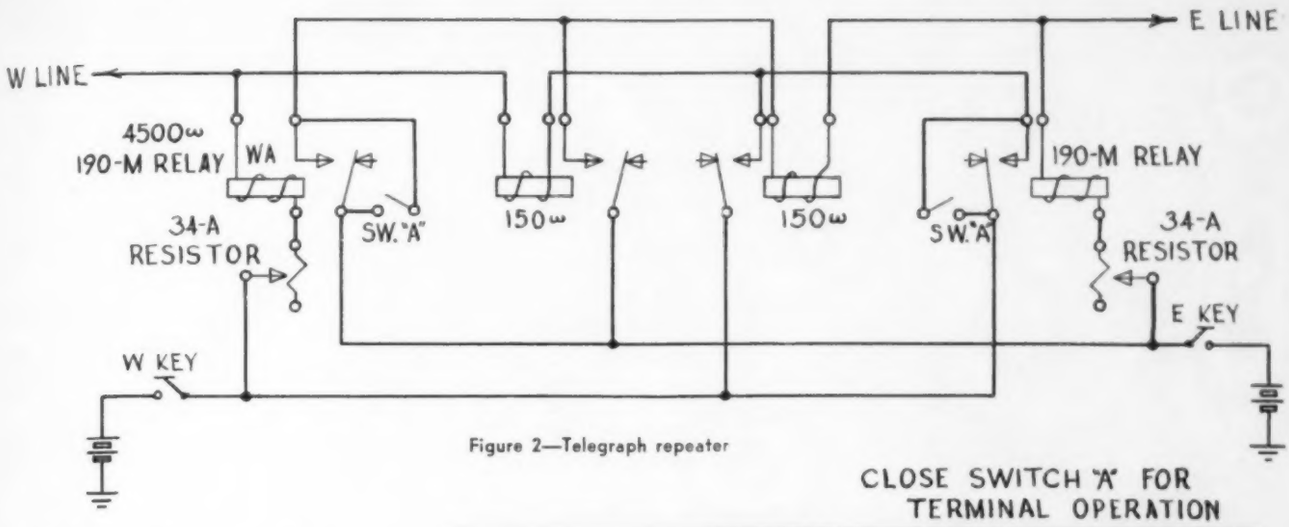


Figure 2—Telegraph repeater

Single Line Telegraph Repeater

A simple single-line telegraph repeater which can be made from standard relays is shown in Fig. 2. This repeater uses two standard 150 ohm telegraph relays together with two high resistance leak relays.

The operation of the equipment is as follows: With both distant keys closed, current flows through the 150 ohm relays the contacts of which short circuit the leak relays. When the west circuit is opened either by the W key at the repeater or at any point along the line, the W line (150 ohm) relay opens, the WA relay remaining open as there is no closed circuit through the west line. Opening of the W line relay opens the east line through the E line relay contacts. This also removes the short circuit across the E line relay and a small leak current flows through it thus closing its contacts. This keeps the W line circuit closed through the W line relay so that when the west key is closed current will flow through the WB relay.

The circuit is simple and reliable and can be used for high speed operation without difficulty. The chief disadvantage lies in the fact that the leak relays may give trouble under heavy weather conditions. An adjustment of the variable resistor will generally compensate for leakage on the line.

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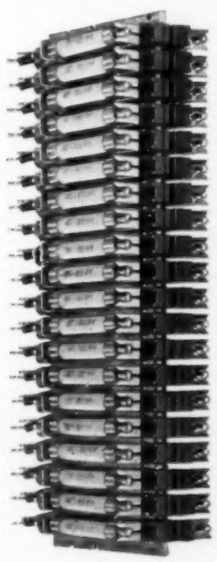

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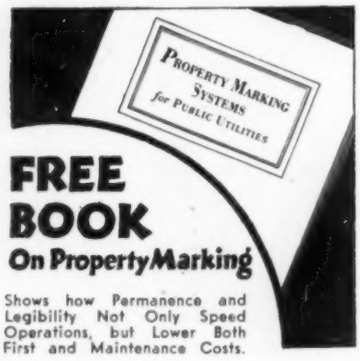
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Open wire line dipping under a railroad at an underpass.

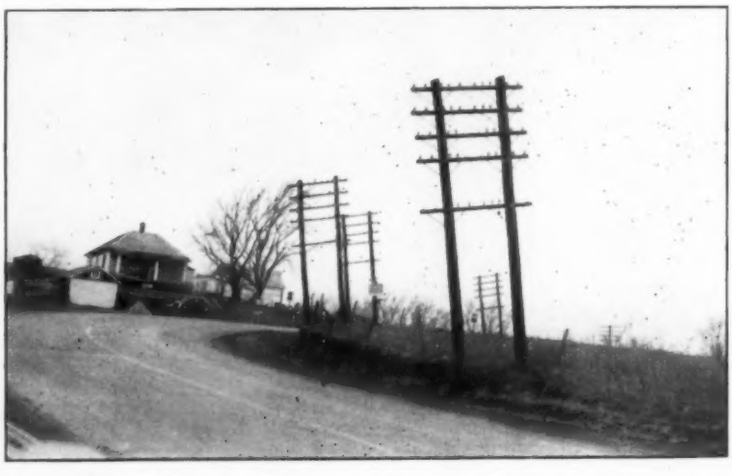
The Unusual In Telephone Construction

(Continued from page 18)

one company being in a special rush hired about five times the number of men which would ordinarily be employed on such a job. The work was not only completed in record time but at a lower cost than had it be handled in the usual manner. Supervision is the secret of working a large gang of men so as to keep them gainfully employed for the number of hours each day they are supposed to work.

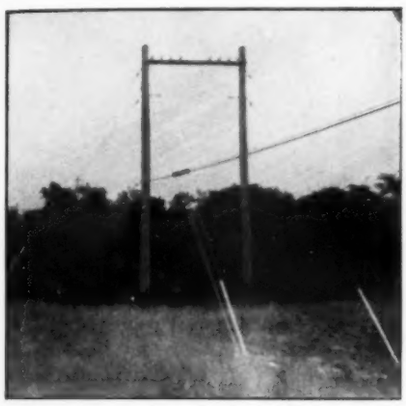
● On present day underground conduit construction jobs the manholes are generally made of concrete. The method generally used is to utilize a small mixer at each manhole. This practice is not generally believed satisfactory as considerable labor is required to transport sand, rock, cement and water to each manhole. Also to clean-up left overs after each manhole is completed. When manholes are being constructed in or near most any fair sized town, it is generally possible to purchase ready mixed concrete at a lower cost than it can possibly be mixed for on the job. When one considers the waste of materials which is unavoidable when mixed at each manhole on the job, the ready mixed is far the better buy. The ready mixed concrete is delivered on the job in mixer trucks which are most convenient for poring manholes of all kinds.

MANY are of the opinion that construction work cannot be successfully carried on in the winter time. While it is true that warm weather is much better for all work of this nature, nevertheless it can be handled in winter, except perhaps in extreme cold sections of the country. We have in mind a certain underground cable job which was completed during the extreme cold weather of 1936. Frozen ground is always difficult though not impossible to excavate by the pick and shovel method. Good sharp picks, kept sharp are an absolute necessity on all winter digging jobs. The poring of concrete in freezing weather is always difficult, though not by any means impossible. Ready mixed concrete may be obtained well heated which is another factor in favor of this method. When concrete is



Special "H" fixtures used around a corner where space will not permit standard down guying.

mixed on the job the sand, rock and water should all be heated before mixing. Old oil drums drums with the ends knocked out are very good for heating sand. A fire can be built inside the drum and the sand piled on the outside to heat. It is usually a quite simple task to keep concrete from freezing below the ground level. It is however a good plan to cover new concrete with straw to prevent the surface from freezing, cracking and possibly weakening before it has set properly. Trenches filled in during freezing weather generally settle after the first thaw so must be refilled and tamped. The dual tires of a heavy construction truck, driven over the trench is a good method of tamping.



Aerial cable sometimes span a large river. When this is done it is generally necessary to use double messenger and special guying to handle the heavy strain.

While in our opinion no special effort should ever be made to attempt the unusual in telephone construction when an accepted plan will do the job. However, there are times when from necessity special methods must be employed.

●

L. E. LaFleur Passes

On January 10th, L. E. LaFleur passed away at Chicago in his sixty-fourth year. Born a Canadian, he received his education in Levis, Quebec, and military training at the Royal Military College, Kingston, Ont.

In March, 1906 he joined the sales force of the Stromberg-Carlson Telephone Mfg. Co., to travel the Ontario territory. After a period he was transfered to the Rochester sales force, and then to the Chicago branch where he became district sales manager. While in this capacity he traveled extensively through the Canadian West.

When the Canadian company became Stromberg-Carlson Mfg. Co. of Canada Limited in 1923, Mr. LaFleur went to Toronto as their assistant manager which position he held until February 1937 when ill health prevented his carrying on.

Many people know the Bell System policy, "To render the best possible telephone service at the lowest possible cost consistent with financial safety." I believe it may interest them to learn how Western Electric helps in the fulfillment of this policy.

Walter S. Gifford

PRESIDENT

A financial statement without figures

In the Bell System, the manufacture, purchase and distribution of equipment are centralized in one organization—Western Electric Company.

From these large scale operations, important economies have resulted, and have made possible repeated reductions in Western Electric prices to the Bell Companies, even in times when the general price trend has been upward.

Western Electric's established policy is to set the lowest prices consistent with fair wages to its employees, a fair return on the money invested in the business, and the maintenance of the Company's financial stability.

The proof that this policy has been observed is that for the past twenty years the Company's rate of return on its investment has averaged less than seven percent.

Western Electric

BELL SYSTEM SERVICE
IS BASED ON
WESTERN ELECTRIC QUALITY

More Hours of Service

. . . that's what every telephone engineer seeks . . . *more hours of service* . . . which means fewer replacements, lower service costs! And that's exactly what Ray-O-Vac telephone batteries offer!

For 3 decades Ray-O-Vac batteries have met and exceeded specifications and requirements on every recognized telephone and light intermittent test, and surpass all government standards. For lower service costs, specify Ray-O-Vac!

RAY-O-VAC COMPANY
Formerly FRENCH BATTERY COMPANY
MAIN OFFICES AND PLANT
MADISON, WISCONSIN
Additional Factories at
Clinton, Massachusetts and Lancaster, Ohio

Line and Desk

RAY BLAIN, Member A.I.E.E., Editor

Q. How can deadends be made with the new compression type sleeves?

A. A special sleeve can be procured for this purpose which does a most satisfactory job. These deadends are easily and quickly made.

Q. What is the composition of the present day lead cable sheath?

A. This may differ considerably with different types and makes of lead covered cables. One commonly used, however, is commercially pure lead and 1 per cent antimony.

Q. What is the color scheme of a 600 pair paper insulated, lead covered, cable?

A. The scheme generally used is to assign the following colors to each 100 pairs;

White-red (Core), White-blue, Orange-white, Green-white, Red-blue, Red-green.

Q. What type fuses should be used in A. C. Power leads supplying current to a telephone system?

A. We would suggest a cartridge fuse of proper amperage. Fuses can now be purchased equipped with a small neon lamp which glows when the fuse opens. This neon lamp holder also makes a convenient handle by which the fuse can be removed easily and quickly.

Q. What method is considered best for splicing parallel type drop wire?

A. The new compression type sleeve is considered very good for this purpose. These sleeves have the advantage that very little of the outer braid need be removed from the wire to use them.

Q. What type of lag wrench is considered best for general telephone work?

A. Most linemen prefer the more modern open end wrench. One type can be obtained with two openings of different sizes at each end. A hole is also provided for turning pole steps. Socket type lag wrenches are also available which are considered very good.

Q. Is there any satisfactory substitute for the double crossarm used for deadening open wire?

A. We use a back brace or truss for this purpose and prefer it to the double arm in every way. The back brace method is much easier and cheaper to install than double crossarms.

Q. What is the composition of rosin core solder?

A. This may differ considerably with different makes and types of solder. Ordinarily such solder consists of an alloy of tin and lead containing by weight approximately 38 per cent tin and 62 per cent of lead. The portion of tin shall not ordinarily be less than 36.5 per cent.

Q. Can a satisfactory visible signal be obtained for use on a desk type telephone?

A. The lamp type signal can be satisfactorily used for this purpose. A lamp which operates from a 110 volt light circuit, controlled by a relay can be obtained or a small neon lamp to light from the ringing current may be used.

Q. We are planning on paralleling a 50 pair cable with an additional 25 pair. Will it be satisfactory to place both cables in one set of rings?

A. We would not recommend this practice. We suggest the use of extra long cable rings which will permit the new cable being suspended under the existing one.

Q. When connecting drop wire to a cable terminal is it permissible to place two wires on one punching and if so how should this be done?

A. This is an approved practice providing the wires are separated by the washers on the punching. The first wire should be placed between the bottom washer and lower nut. The second wire is placed between the two washers and the top nut tightened.

Q. What type cable chair is considered best for general aerial cable maintenance?

A. This will depend considerably on the individual taste of the user for numerous types of good cable chairs are now on the market. There is the rigid and the non-rigid type, equipped with wheel guards and hand brakes when desired. Rubber tread wheels may also be obtained.

Q. We wish to provide for some mechanical protection for small cables run through basements. What would you recommend for this purpose?

A. Metal U-cable guards can be successfully used for this purpose. Wood moulding, sometimes referred to as ground wire guards can also be used to good advantage on small cables and can be purchased at a very reasonable cost.

OUR FRONT COVER PICTURE

Tampa's "South Florida Mid-Winter Fair," first presented in 1904, was the modest beginning of the present Florida State Fair which for many years has maintained its place as the greatest Mid-Winter Exposition in the United States.

The late Mr. W. G. Brorein, founder of the Peninsular Telephone Company and its president until his death, always took a prominent part in all civic affairs of Tampa, the headquarters of his company, which has grown to be the largest independent company in the Southeast. For twenty-two years he was president of this Fair.

From 1904 until 1910 Mr. Broerin was treasurer of the Fair. He had been in Tampa only three years when he assisted in forming the Fair association, and in 1915 when it was incorporated as the South Florida Fair, Mr. Brorein was elected president. In 1933 the Fair was reorganized as the Florida Fair Gasparilla Association, tying in more closely with the Gasparilla activities, which are now comparable with New Orleans' Mardi Gras.

Soon after Mr. Brorein's death in 1937, his nephew, Carl D. Brorein, who is at present vice president and general manager of the Peninsular Telephone Company, was elected president of the Fair association. The State Fair Grounds are located in the heart of the city, adjoining the famous three million dollar Tampa University. The Fair buildings, race track, and grounds represent an investment in excess of two million dollars. In 1939, the Florida Fair, collaborating with the United States Government, will celebrate a Pan American Exposition, the 400th anniversary of the landing of Hernando DeSoto and his expedition in Tampa Bay in 1539.

High spot of the fair is the annual invasion of Tampa by the Gasparilla Krewe, culminating in a parade in which over eighty floats, bands, and marching units participated on January 31st of this year. The Peninsular Telephone Company entered the beautiful, streamlined float which appears on the front cover of this issue of the TELEPHONE ENGINEER. It is estimated that at least 200,000 people saw the float in this parade and an additional 300,000 will view it in the five other parades in Tampa and other cities of the Peninsular territory in which it is entered. Spot lights were trained upon the 8-foot hand-set in its appearance in three night parades. Final parade of Florida's winter season will be the Festival of States' Parade in St. Petersburg.

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A good specification - always!

OLIVER MACHINE BOLTS
ANCHOR RODS and BRACES

—are subject to the special Oliver double dip, hot galvanizing process which gives them maximum resistance to rust and corrosion.

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PITTSBURGH, PENNSYLVANIA

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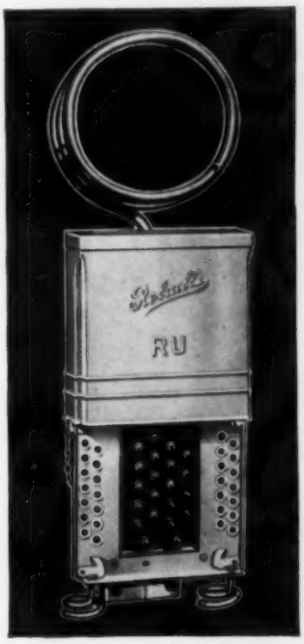
OLIVER

A DEPENDABLE
CABLE
TERMINAL



Reliable

Type RU unprotected terminals are easy to install, easy to work on and built to outlast the cable.

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Reliable ELECTRIC COMPANY
OVER 25 YEARS SERVICE TO THE UTILITIES
3145 CARROLL AVENUE · CHICAGO ILLINOIS

TEST DESK OPERATION

(Continued from page 24)

(6) After thus obtaining the loop resistance of the line arrange the Bridge switches in their "Varley" position, connect one pole of the Bridge battery to ground by means of the key designated for that purpose and make the Varley measurement.

The distance to the fault may then be calculated as follows: The value of the loop resistance minus the home office cable pair resistance minus the resistance of the distant central office cable pair, phantom coil, or switchboard drop resistances, as the case may be, minus the Varley measurement divided by 2 and the quotion thus obtained divided by one half of the known resistance per loop mile of the open wire portion of the line in trouble, or D=L—C—DP—V/12/HLM where, "D" equals distance in miles from the cable terminal pole to the fault or ground. "L" is the loop resistance in ohms as measured to the short circuit put on the line at the distant end, "C" is the resistance of the cable conductors to the terminal pole. This to include the conductor resistance at the distant central office area also, "DP" is the resistance of the phantom coil or switchboard drop at the distant central office, "V" the Varley measurement in ohms, and "HLM" one half of known resistance per loop mile of open line wire in trouble.

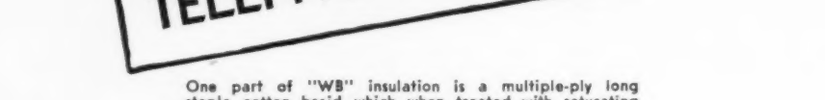
● Example 1. A toll line consisting of 109 (No. 12 gauge) iron wire between two central offices is grounded and a short circuit is put on at the distant end with the result that a loop resistance is obtained having 599.4 and a Varley of 213 ohms, then D=L—V/2/H L M, or 599.4 —213=386.4/2=193.2/33=5.8 and is the distance in miles to the fault.

Example 2. A toll line is grounded and a short circuit cannot be conveniently put on at the distant end, thereby necessitating measuring into the toll line switchboard drop in the distant central office with the result that a loop resistance is obtained having 1367 ohms and a Varley of 172 ohms. The testing point exchange cable pair is 18 ohms, the distant exchange area cable pair and switchboard drop is 22 and 500 ohms respectively. The toll line in trouble is 109 iron wire having a loop per mile resistance of 66 ohms, then D=L—C—DP—V/2/hlm, or 1367—18—22—500—172—=655/2=327.5/33=9.9 which is the distance in miles from the toll line entrance cable terminal pole located in the testing point exchange area to the fault.

WHITNEY BLAKE TELEPHONE WIRE

One part of "WB" insulation is a multiple-ply long staple cotton braid which when treated with saturating and finishing compounds results in a specially compounded wire that is highly resistant to abrasion and remarkably flexible under extremes of heat and cold.

Illustrated is No. 20 Bridle Wire Twisted Pair Spec. 4823.



THE WHITNEY BLAKE COMPANY
NEW HAVEN, CONNECTICUT

WB

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"Tapping In" On Washington

(Continued from page 20)

port on its journey to Congress, the recent decision of the Wisconsin state circuit court in rejecting the rate investigation and reduction promulgated by the Wisconsin Public Service Commission is of interest. It holds some relevancy not only because the Wisconsin Commission's rate investigation traveled over much of the same ground as the FCC $1,500,000 inquiry, but also because the principals in the FCC Investigating staff were drafted from the ranks of the Wisconsin Commission. The Circuit Court in its opinion on the Wisconsin Commission's conduct of the case and the results of its findings deals harshly with the principles and views brought out in the FCC Investigation, particularly in regard to Western Electric prices and the Bell System's depreciation record. Furthermore, in several places the FCC Investigation chief engineer, Cyrus Hill, who was the principal engineer of the Wisconsin Commission rate case, is severely castigated for his findings as being based on "fales and erroneous" premises by the Circuit Court. If the Wisconsin Supreme Court should uphold the circuit court's decisions in this case, the telephone industry will have a potent weapon to assail the FCC Investigation before Congressional committees.

Chairman McNinch To Remain At FCC

THAT Chairman Frank R. McNinch will remain at the helm of the FCC seems rather definitely assured. The FCC Chairman indicated in a speech before a broadcasting industry group that he would not return to his former position as head of the Federal Power Commission because he had grown to be fascinated by the opportunities of the Communications Commission's work, especially in the broadcasting field.

Mr. McNinch in his record at the Power Commission was known to be adamant in carrying forward to the limit the principles of regulation which he considered to be the duty of that agency, but he has been considered as fair and just in his rulings and willing to accept all evidence about utilities which was substantiated and proven to be in the public interest. It is believed that in regard to the telephone industry he will maintain an open mind on controverted issues and will decide such questions on their merits.

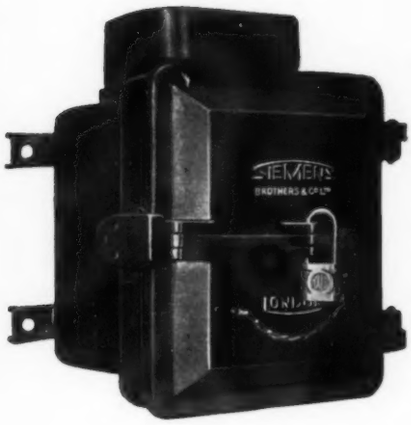
● The reorganization of the FCC has been a long hard road for Chairman McNinch since he assumed the helm of that agency last October. While

(Please turn to page 45)

SIEMENS

"NEOPHONE"

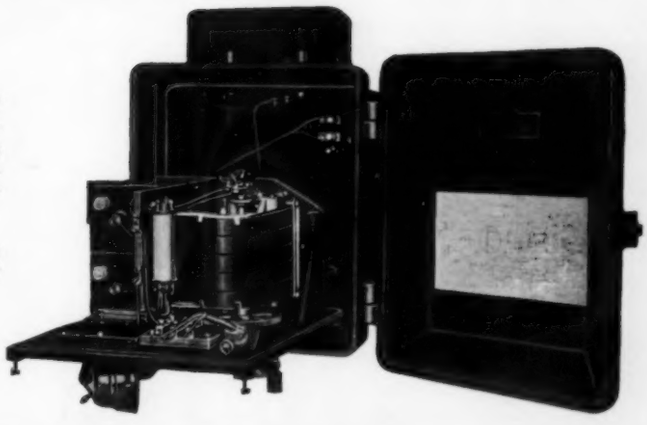
WEATHERPROOF MAGNETO TELEPHONE



for Traction Routes, Police Services, Ambulance Call Systems, etc.

A special feature is the employment of a "Neophone" handset in place of the fixed transmitter and separate receiver generally fitted on telephones of this kind. This not only makes it very convenient to use, but also provides the unrivalled transmission efficiency and superior articulation for which the "Neophone" is noted.

In addition, the incorporation of our patent antisidetone circuit enables conversations to be carried on comfortably in noisy situations.



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KLEIN
"Lightweight"
CLIMBERS

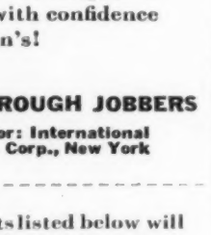
Klein "Lightweight" Climbers are built to the minimum weight possible consistent with maximum safety. Every pair is tested exactly the same as are the old time tried Standard Climbers. The lineman can throw his weight on these climbers with confidence —they are Klein's!

DISTRIBUTED THROUGH JOBBERS

Foreign Distributor: International Standard Electric Corp., New York

The four pamphlets listed below will be sent without charge to anyone interested. Check the ones you want:

- ☐ Lightweight Climbers.
- ☐ Specifications on Linemen's Belts and Safety Straps.
- ☐ Klein Kord Fabric Safety Straps.
- ☐ Pocket Tool Guide.



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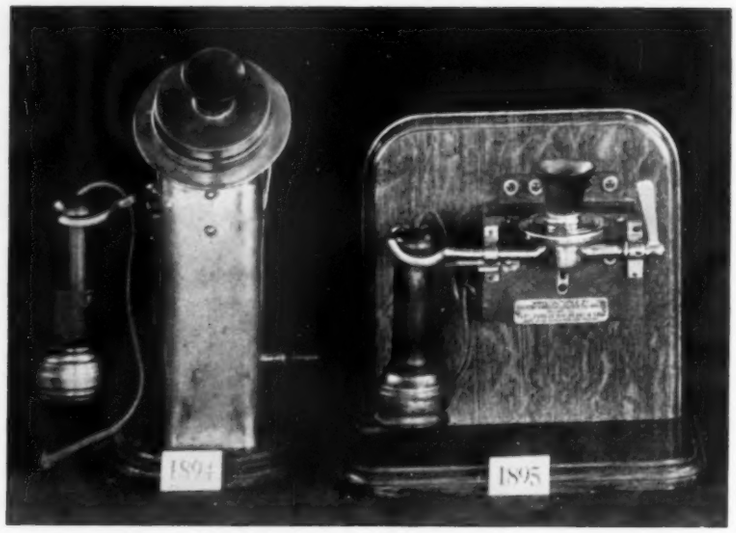


Two early Stromberg-Carlsons, forerunners of the modern handset.

Stromberg-Carlson Refinements

"Mr. Watson, come here I want you."

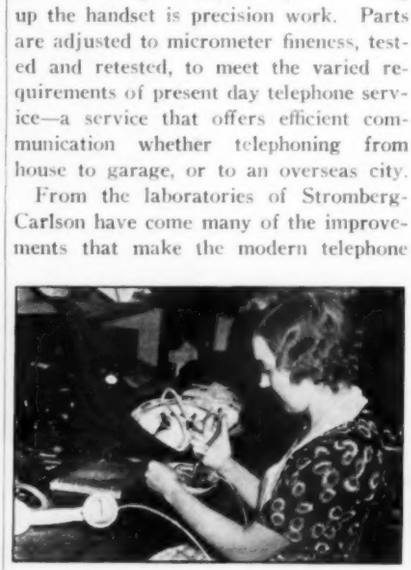
Since that historical day in 1876, when Alexander Graham Bell telephoned that simple request to the adjoining room the efforts of many brilliant minds and hands have gradually perfected telephones to the efficient, sturdy, graceful instrument of today. In contrast to the antiquated desk phones used during the pioneer days of telephony, clumsy and crude to our eyes accustomed to streamlines, are the late handsets moulded to pleasing forms in smooth plastics of many hues.

● Assembling the separate parts making up the handset is precision work. Parts are adjusted to micrometer fineness, tested and retested, to meet the varied requirements of present day telephone service—a service that offers efficient communication whether telephoning from house to garage, or to an overseas city.

From the laboratories of Stromberg-Carlson have come many of the improvements that make the modern telephone a thing of beauty, capable of enduring hard usage without impairing its high efficiency. One of the outstanding recent developments they have contributed is the placing of the induction coil, condenser and ringer in the base of the instrument to eliminate the separate bell box. Since this advance in telephone design of Stromberg-Carlson, self-contained handsets have proved popular with the entire industry.

● Most recent Stromberg-Carlson design incorporating the feature is the new 1212 Handset which was put in production December 1st. Manufacture also started at the same time on a new wall type telephone, No. 1210.

Three features distinguish the new wall type and cradle type Stromberg-Carlsons—beauty, compactness, convenience. They offer the user transmission qualities which set a new standard and are at the same time an attractive article of office or household equipment, rather



Assembling the telephone base.

Switch plate assembly. Used in base of the telephone.

Pouring granulated carbon into transmitter carbon cup.

Assembling the arm, consisting of transmitter and receiver.

Assembling the cradle stands.

than a mechanical device to be placed anywhere.

In designing these new instruments, it was Stromberg-Carlson's purpose first to create a base or cradle that would not only serve as a bell box but would also be an ornament on the wall or an artistic pedestal on table or desk. To accomplish this, noted designers were called into consultation. Their remarkable success in achieving this purpose is shown by the instruments themselves.

But beauty is not their sole feature. They have a compactness, a convenience and a workability that insure the utmost simplicity in installation and maximum service in use. The results are low cost of installation and upkeep to the operating company and the greatest amount of satisfaction to the subscriber.

The Stromberg-Carlson 1212 Handset which introduces several innovations, is moulded in a graceful, curving design of mar-resisting, black phenol compound. Ringer, induction coil and condenser are mounted on a pressed steel base, over which a graceful cradle supports the handset unit — a compact assembly of transmitter and receiver. The base may be uncovered easily by removing two screws, making all parts readily accessible.

The handset unit is built so that as long as the user holds the receiver to his ear, the transmitter is always in correct relation to the user's mouth, insuring proper transmission of his message. Low side tone pick up qualities filter out room noises and reduce sound reverberations in the receiver to half the ordinary amount.

The hookswitch employs extra-long, flexible springs designed to make perfect contact at all times while it is being operated.

Two gongs of varying thicknesses of brass accomplish a two-tone effect that gives a pleasing attention-compelling signal that can be herd clearly through louvres at the rear of the base. A grille cloth behind the louvres prevents dust from entering. The induction coil is of a special design, made of high grade iron which makes possible a reduction in size over the conventional type of about one-third. Phenol compound spool heads supply perfect insulation. Fixed electrical characteristics are maintained by steel laminations held in place by clamps. Though much smaller, the induction coil does the work of larger coils with equal efficiency.

Provision is made for dial installation without adding a sub-base. Such an addition can be made inexpensively without destroying the beauty of the telephone.

Companion to the 1212 Handset is the new Stromberg-Carlson 1210 Wall Set, in an outstanding streamlined design of molded black phenol compound. Its receiver-transmitter unit is assembled in a compact handle and has a Duratex Cord long enough to give all the convenience of a telephone on the subscriber's table or desk.

All parts of the 1210 Wall Type Handset are mounted on a pressed steel base where they are easily accessible. Greater ease of mounting this telephone is effected by using two bayonet slots in its base, one vertical and one horizontal, through which it is attached to the walls by screws. Thus a screw can be sunk first, and the phone suspended while it is easily made firm with the other screw. This new method of mounting insures firmness with a minimum of installation work.

New Stromberg-Carlson 1210 Wall Telephone

Ringer and induction coil of the Wall Set are interchangable with those in the 1212 Handset. Each phone can be supplied in both straight line biased or harmonic ringer types. The hookswitch of the 1210 Wall Phone has only one moving part which is hidden within the holder of the handset unit, securely protected from any possible injury. Twin contacts on springs make sure of positive connections.

New Stromberg-Carlson 1212 Handset.

The high quality transmission and reception which these new Stromberg-Carlson Handset Telephones provide are accomplished by the special Stromberg-Carlson transmitter and receiver. In the transmitter is a cone-shaped diaphragm which moves as a rigid piston; annular corrugations near the outer edges give maximum flexibility. The receiver is completely assembled as a unit with the ear cap and diaphragm and tested. This unit is threaded into the handle with the ear cap holding the diaphragm in its proper position.

Bell Station At All-Time High

Telephones in service of the principal telephone subsidiaries of the American Telephone & Telegraph Company, included in the Bell System, reached a new all-time high record in February, according to figures made public by the company.

Telephones in service increased 30,000 during the month to a peak of 15,393,483.

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NEW KELLOGG PRODUCTS

One of the new floor type Kellogg private branch exchange switchboards

With the recent addition of several new Masterbuilt PBX switchboards, Kellogg Switchboard and Supply Company now offers a complete line of modern PBX's that meet every requirement. These smooth, business-like Private Branch Exchanges are available in every desirable size of floor or cordless types.

The floor models feature the same rigid steel framework construction as the well-known 6-800 Masterbuilt line. The beautiful wood side panels and rounded top are hung on this welded steel frame and can be readily removed when necessary. A swinging relay gate carries all the line, cord and miscellaneous relays and provides easy access to all equipment. The attractive black Bakelite face and shelf contrasts richly with the quarter-sawed sides and panels and the black linoleum kick board. These floor models are available in three sizes—50 lines, 100 lines, and 200 line capacity and can be furnished in any finish desired.

The cordless PBX's too, are a departure in design from the usual type of switchboards. They are low and compact; of modern, up-to-date appearance; and fit into most any surroundings. The black Bakelite face beautifully contrasts with the metal keys, colored handles and the fine, dull-rubbed cabinet. Either oak or walnut are standard cabinet woods, but any

THEY'RE "the Tops"

RIGHT DOWN THE LINE....

Vacuum Grip Pliers

Over a Million in Use

COMPANY officials who deal with budgets can not fail to note the economy of Vacuum Grip Pliers. Purchasing Agents receive praise for the substantial savings effected. Superintendents and Foremen get excellent reports from the workers who use them. And Linemen and Electricians become enthusiastic rooters for Vacuum Grip Pliers because they do a better job in less time, at a saving of labor. Pliers that attract such favorable attention "right down the line" wherever introduced are efficient and economical tools for your company.

87—HEAVY DUTY DIAGONALS. An exclusive Vacuum Grip pattern. Most powerful diagonals made—and the most economical. Hand-filed blades, perfectly matched. Tapered nose. Spring tempered handles, full fashioned. Easy riding joint, opens at a touch. Full polished. Length 7"—$2.50.

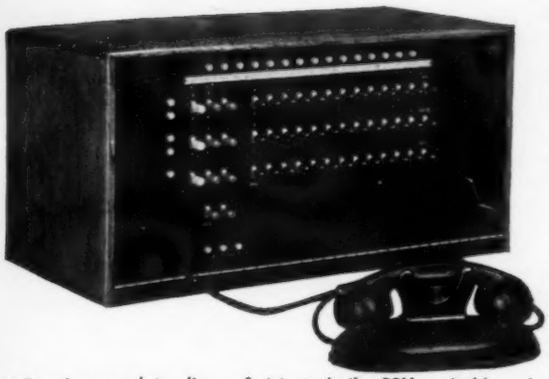
86—HEAVY DUTY DIAGONALS. Similar to 87 but smaller, for use on jobs that call for medium sized diagonals. Oversize cutting capacity. Full polished. Length 6"—$2.00. No. 85—5"—$1.65. No. 84—4"—$1.50.

186—STANDARD DIAGONALS. For Electricians and Switchboard Mechanics. Very powerful although light in weight. Accurately aligned blades, specially edged for cutting insulation clean as well as wire. Tapered nose. Full polished. Length 6"—$1.90. No. 185—5"—$1.75.

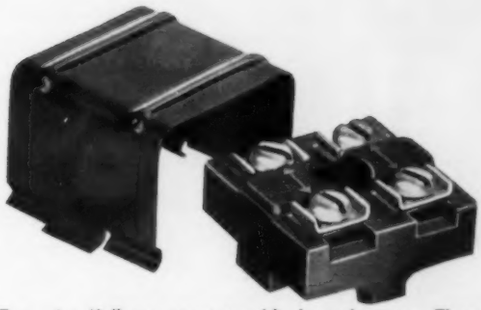
196—NEEDLE NOSE PLIERS. (Heavy duty, light weight). Very popular among Telephone Electricians. A powerful gripping and cutting tool that gets into the hard-to-reach places. Full polished. Length 6"—$1.85. No. 195—5"—$1.75. Same but without wire cutters No. 96—6"—$1.50. No. 95—5"—$1.50.

RUNNING TESTS AT OUR RISK. Write for full particulars and catalog. Ask for prices on lots of one-half dozen or more.

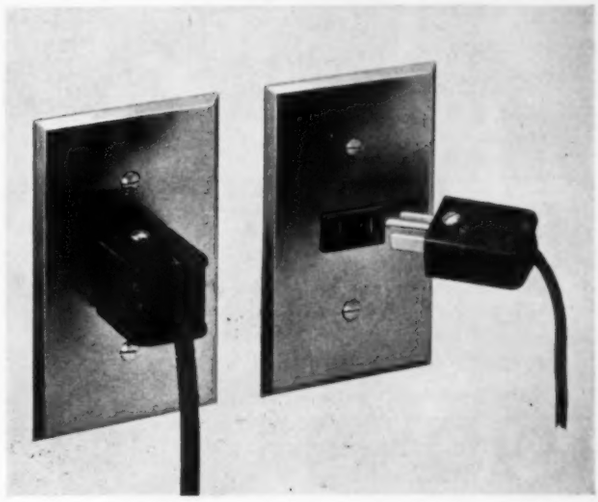
FORGED STEEL PRODUCTS CO., Newport, Pa.



Kellogg's complete line of Masterbuilt PBX switchboards includes this modern streamlined cordless type.



Two wire Kellogg connector blocks and covers. These are the only blocks made of moulded Bakelite and Enduro rust-proof metal.



New Plug and Jack especially designed for use with portable telephones produced by the Kellogg Company.

other wood or finish can be furnished.

Kellogg has added many new construction features. The front panel is hinged at the bottom with a full-length piano hinge. This gives easy access to the keys and lamps. By simply lifting the cabinet off, full access is given to all equipment. The relays, condensers, fuse panel and connecting rack are mounted on a steel frame chassis which is fastened to the baseboard, and the generator crank is conveniently located in the front. Cabinets of any one type are interchangeable. They are available for magneto as well as common battery use in sizes to meet all requirements.

A New Connector Block

Here is the answer to a long felt need for a practical, low-cost connector block for connecting the telephone cord to the line wire leads. This connector block was recently introduced by the Kellogg Switchboard and Supply Company of Chicago. The use of these blocks save the installers' time and assure fool-proof connections. Connections are made quickly and easily and eliminates entirely the nuisance of soldering and taping.

Kellogg Connector Blocks are made in two sizes—the two point block for connecting up two wires, and the three point block for connecting up three wires. Either is furnished with or without cover as desired. The blocks are quickly attached in any position and in almost any place with ordinary wood screws. Countersunk screw holes eliminate any possibility of shorts across the screw heads. Connections are quickly and easily made by simply inserting the cord tips or wires and tightening the binding posts. And if changes or tests are made, the use of these connector blocks simplifies the work and saves time over the old method of handling soldered or taped connections.

The connector takes all types of cord tips and all sizes of wire. This eliminates the necessity of stocking several

For Latest Prices

and other information about the construction materials and supplies you are going to need this spring, refer to your

New No. 46, 1938

Suttle Salesman Catalog

(That one with the bright green mottled cover that you got just a few days ago.)

You'll fiind all standard supplies listed in it with present day prices. It's handy to plan from, and easy to figure costs.

Suttle Equipment Co.

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A complete Accounting Service For Telephone Companies.

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"SALES POSITION OPEN"—For experienced telephone man, selling supplies and service to Independent telephone companies in Wisconsin and Minnesota. Age between 25 and 40. Wide acquaintance in field valuable. Salary. Good proposition. Give details of experience in first letter. Address Box 1014, Telephone Engineer.

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A New Telephone Repeater

Self-adjusting to changing impedance. No balancing nets. Adapted to Line, Terminal and Cord-circuit uses. Accurate balance; high gain.

Harding Telephone Repeaters
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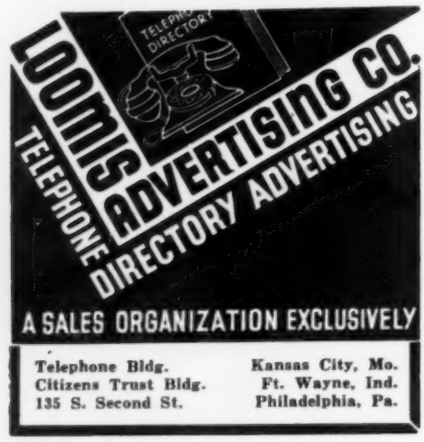

Telephone Bldg. Kansas City, Mo.
Citizens Trust Bldg. Ft. Wayne, Ind.
135 S. Second St. Philadelphia, Pa.

types of connectors to fit various tips and wire sizes. The one-piece block is made of moulded Bakelite with separators and slots to hold the cord tips in place and prevent them from shorting or moving.

New Handy Wall Outlet Plug and Jack Brings Added Revenue and Influences More Extension Contracts

(Picture on page 43)

Here is a new combination of plug and jack especially designed for use with portable telephones. It was recently introduced by the Kellogg Switchboard and Supply Company as a new profit item for telephone companies that provides a more convenient service for the subscriber. These simple, economical telephone wall outlets can be placed in any desired location. Now a telephone can be carried from room to room, upstairs or downstairs—wherever it may be most convenient. These outlets make the telephone as portable as a lamp, and because of this extra convenience, the telephone becomes more useful.

The brushed brass jack mounting plate is of the same size as the conventional electric outlet plate and fits standard outlet boxes. Convenience of jack installation and the ease of cord attachment are features of this outlet. Only a screwdriver is required to attach the plate to the outlet box. Connections are made by soldering the line wires to the jack terminals, or if desired, screw connections are easily made by adding a No. 6 screw and nut to each jack terminal. Plugs have provision for stay cord and are arranged to take standard spade cord tips. The plugs are so designed that they cannot be improperly inserted in the jacks. The prongs are flat and chamfered to provide smooth operation. Jack springs grip these blades firmly. Jack and plug bodies are of moulded plastic and the metal plug cover is finished in durable crystalline black.

WANTED: Auditor for telephone company operating approximately 15,000 stations. Age 27 to 35 years. Enclose small photograph with application outlining education, age, experience in telephone accounting and references. Box 703 Telephone Engineer.

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Finished Cedar Poles
VALENTINE CLARK CORPORATION
St. Paul, Minn.

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Call L D 16—Telephone Bldg. Dayton O.

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The Clearing House

For the convenience of readers of Telephone Engineer

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Movements only
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With new shells and caps
Write for circular

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COLUMBUS, OHIO

RECONSTRUCTED EQUIPMENT

Genuine Western Elec. No. 1317 Pony type 3-bar 1000-1600 or 2500 ohm ringer compact wall telephones with short arm and slope Shelf. @ $9.25—5-bar $11.75

Genuine Western Elec. No. 20AL desk set with No. 315 3-bar 1000-1600 or 2500 ohm ringer inside connection signal set @ 10.00

Western Elec. No. 20AL. desk set with Transmitter, Rec. & Cord less signal set @ 5.50

Kellog No. 118 desk set with Trans. & Rec. Complete with 3-bar 1000-1600 or 2500 ohm ringer external post connection set @ $8.50—5-bar @ 10.75

Kellogg No. 2808 Pony type 3-bar 1000-1600 or 2500 ohm ringer compacts with short arm @ $9.00—4-bar @ 10.50

Kellogg No. 2696 type 4-bar 1000-1600 or 2500 ohm ringer compacts with short arm @ 8.00

Kellogg No. 84 unbreakable desk set with No. 2328 3-bar 1000-1600 or 2500 ohm ringer insise connection signal set @ 10.00

Stromberg Carlson No. 896 Pony type 3-bar 1000-1600 or 2500 ohm ringer compacts with short arm and slope shelf @ 8.75

Stromberg Carlson No. 988 desk set with 3-bar 1000-1600 or 2500 ohm ringer external post connection signal set$8.75—4-bar @ 9.50

Monarch No. 33 desk set with 3-bar 1000-1600 or 2500 ohm ringer inside connection signal set @ 7.85

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Western Elec. No. 20 desk set with Dean or Monarch Trans. complete with external post 3-bar 1000-1600 or 2500 ohm ringer signal set @ $7.75—4-bar $8.50—5-bar @ 10.00

Western Elec. No. 122 Receivers with posts less cord @ ..... .65

Write for Bulletin

REBUILT ELECTRIC EQUIPMENT CO.
1934 West 21st St., Pilsen Sta.
Chicago, Ill.

"Tapping In" On Washington

(Continued from page 38)

criticism has arisen that he has been cautious and slow in the "cleanup" process, it is expected that the next few months will witness an acceleration of those efforts towards a satisfactory solution. Within the Commission there still prevails a division of viewpoints among the individual Commissioners as is only a natural circumstance. But the leadership of Mr. McNinch is felt to have eliminated a good deal of the personal jealousies which had previously existed and to have narrowed such differences among the Commissioners to the status of opposing stands on policies to a very substantial degree.

Important Labor Issue Before NLRB

The National Labor Relations Board will hold a most important proceeding from the standpoint of the telephone industry on April 5 in Washington when it hears oral arguments in connection with the rival claims of the International Brotherhood of Electrical Workers (A. F. of L.) and the Wisconsin Independent Telephone Operators' Union. The IBEW has charged that the Wisconsin Bell Telephone Co. has fostered and dominated the Independent operators union, while the latter claim complete freedom from any sort of management control. *The A. F. of L. group has requested the Labor Board to permit it to have collective bargaining elections to represent the Wisconsin Company's telephone operators by exchange. The Independent Union which claims a majority of the operators for the state of Wisconsin has asked for a state-wide election.*

●

General Tel. Station Report

General Telephone Corporation reports for its subsidiaries a gain of 779 company-owned telephones for the month of February, 1938, as compared with a gain of 2,334 telephones for the month of February, 1937. The gain for the first two months of 1938 totals 1,727 telephones (exclusive of purchases) or .47%, as compared with a gain of 4,144 telephones, or 1.24% for the corresponding period of 1937.

The subsidiaries now have in operation a total of 365,140 company-owned telephones.

The New
A-C
SUPER-SENSITIVE
J-C
RECTIFIER TYPE SIGNAL RELAY

• Operating current 200 micro-amp (.0002 amp) at any frequency up to 15,000 cycles — RUGGEDLY BUILT—EASILY ADJUSTED. It solves the telephone signaling problem. Write for descriptive bulletin.

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Rebuilding and Repairing
TRANSMITTERS
Grounded Transmitters Made Metallic

Western Electric grounded type of transmitters, black enameled and rebuilt into metallic late style with full floating diaphragm similar to the No. 323 or No. 337 transmitters ..... $ .80

We guarantee to improve the transmitter 3 decibels and lower the battery consumption by 20% on all such transmitters we rebuild. A trial order solicited, with money-back guarantee that the work must be satisfactory or may be returned at our expense.

Metallic type of transmitters, completely rebuilt, each ..... .50

Full information on request.

SPECIAL
Slightly used pole line material, F.O.B. Reading, Pa.

No. 9 Pony Glass Insulators, per 1000 ..... $20.00
Double-transposition glass insulators, per 100 ..... 5.00
Galvanized X-arm back braces, ea. ..... .75
30-inch galvanized X-arm braces, ea ..... .05
F.O.B. Chicago, Ill.
½x18 galvanized double-arm bolts, per 100 ..... 8.25
½x14 galvanized double-arm bolts, per 100 ..... 6.65
½x12 galvanized through bolts, per 100 ..... 5.55
2-cell battery cans, @ ..... .75
W. E. rebuilt heavy-duty No. 1317 5-bar 1600 or 2500 wall phones 12.00

Telephone Repair Co.
Daniel H. McNulty, Manager
Rogers Park Station Chicago

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Important users say, "We have had excellent reports from our men in the field." "Is easier on the operator; performs the work faster than any other pruner head we have ever used." "We have not experienced any breakage whatsoever." "In constant use nine hours a day for the past three months—proves to be the best pruner head made." "All of our men are asking for this type and we will have to take the others off the field."
Reports like these and constantly growing orders from public utility companies prove the superiority of Seymour Smith Telephone Pruners. Why don't you write us for prices and complete information?
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FOR EXPANSION BOLTS, CONDUITS, ETC.
WODACK "DO-ALL"
This is the electric hammer that can be changed to a drill for metal and wood. Two sizes. Ask for prices.
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RTC-2
The New Vincent Rare Gas Relay
For Quiet Transmission On Rural Party Lines
Has lower voltage drop for better ringing with either coded or harmonic bells. Installed with a single screw!
Send for details explaining how the RTC-2 Relay will greatly improve your service at low cost.
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Index to Advertisements

A

Acorn Insulated Wire Co. —
Aiken Anchor Co. —
Albertson Electric Co. —
Allen Electric Co. —
American Coach & Body Co. —
American Steel & Wire Co. —
American Tel. & Tel. Co. 12-13
Automatic Electric Co. 26-27

B

Bartlett Mfg. Co. —
Bashlin, W. M., Inc. —
Bell Lumber & Pole Co. —
Berry, L. M. 44
Bethlehem Steel Co. —
Bowdle Accounting System 44
Brach, L. S. Mfg. Co. 46
Brown Wood Preserving Co. —
Buckeye Telephone Supply Co. 45

C

Calculagraph Co. 15
Carney & Co., B. J. 44
Chance Co. A. B. —
Churchill Cabinet Co. —
Coffin Hoist Co. —
Communication Equipment Engineering Co. —
Cook Electric Co. 33

D

Davey Tree Expert Co. —
Dillon Mfg. Co. 14

E

Electric-Storage Battery Co., The 11
Everstick Anchor Co. —

F

Forged Steel Products Co. 42
Four Wheel Drive Auto Co. —

G

Gardiner Metal Co. —
General Motors —
Gould Storage Battery Corp. —
Graybar Electric Co. 31
Grobet File Corp. —

H

Habirshaw Div., Phelps Dodge Copper Products Corp. —
Harding, Wm. 44
Herdrich & Boggs —
Holtzer-Cabot Electric Co. —
Hubbard & Co. 47

I

Indiana Steel Products Co. —
Indiana Steel & Wire Co. 47
International Crossarm Co. 42

J

Jester-Cooper Co. 45
Johns-Manville —

K

Kearney Corp., Jas. R. —
Kellogg Switchboard & Supply Co. 4-5
Klein, Mathias & Sons 40
Koppers Company —

L

Larkin & Co., John C. 44
Leich Sales Corp. 16
Lenz Electric Mfg. Co. 14
Littelfuse Laboratories —
Loomis Advertising Co. 44
Lorain Products Corp. 14

M

Majestic Hotel —
McCreary, Harold J. —
Michigan Pole & Tie Co. —

N

National Carbon Co. 6-29
National Telephone Supply Co. 2
North Electric Mfg. Co. 48

O

Oliver Iron & Steel Corp. 37
Owens-Illinois Glass Co. 2

P

Pensacola Creosote Co. —
Phelps Dodge Copper Prod. Co. —
Phillips Electric Works, Ltd., Eugene F. —
Potosi Tie & Lumber Co. —
Premax Sales Division 34

R

Ray-O-Vac Co. 36
Ready Mfg. Co. —
Rebuilt Electric Equipment Co. 45
Reliable Electric Co. 37
Russell, C. B. —
Runzel Cord & Wire Co. —

S

Seymour Smith & Sons, Inc. 46
Shallcross Mfg. Co. —
R. S. Shely 44
Siemens Bros. & Co., Ltd. 39
Signaphone Corp. —
South Bend Lathe Works —
Stevens Hotel —
Stromberg-Carlson Tel. Mfg. Co. 7-8-9-10
Sundt Engineering Co. —
Suttle Equipment Co. 43

T

Telkor, Inc. 2
Telephone Repair Co. 45

U

Union Carbide & Carbon Co. 6-29
Unique Mfg. Co. 47
United Motors Service Inc. —
U. S. Steel Corp. —
Utility Tool & Body Co. —

V

Valentine & Clark Corp. 44

W

Western Electric Co. 35
Whitney Blake Co. 38
Williams, Geo. E. —
Wodack Electric Tool Co. 46
Wood Preserving Corp. —
Wopat, J. W. 44
Wray, J. G. & Co. 44

Y

Yale & Towne Mfg. Co. —